NATIONAL CAR BUILDER

VOLUME XII. NUMBER 4.

DEVOTED TO THE INTERESTS OF RAILWAY ROLLING STOCK.

$1.00 PER ANNUM. SINGLE NUMBERS, TEN CENTS.

NEW YORK: **Published at 5 and 7 Dey St.**

APRIL, 1881.

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CHICAGO: **40 Dearborn Street.**

NATIONAL CAR-BUILDER DIRECTORY.

THE CONTINUOUS DRAW-BAR CO.,

OF CINCINNATI, OHIO,

Will sell Railroad Rights for their valuable Continuous Draw-Bars for Passenger and Freight Cars, which are now so rapidly superseding the old drawing attachments.

We have purchased and now control the following patents: Allen Middleton, Phila., 2 patents; Griffith & Patterson, Cincinnati, Ohio; J. Caum, Phila.; and D. Hoit, Albany, N. Y.

Upward of 30,000 cars, including those of the leading trunk lines of the country, have already been equipped with these draw-bars, and they are every day becoming more popular Their application saves railroad companies from 20 to 40 per cent. in first cost, and not less than 50 per cent. in daily running repairs.

For particulars address

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SAMUEL GRIFFITH, General Western and Southwestern Agent, 142 Dearborn Street, Chicago.

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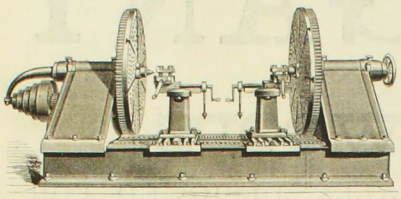

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VIZ.:

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ALSO,

VAN LIEW'S OUTSIDE CAR DOOR HANGER.

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The many thousands of Cars equipped during the past 5 years on roads such as C. & N. W., P., F. W. & C., Grand Trunk, Mo. Pa., Penn. Co. & Lines, C. & A., A. T. & S. Fe, Wab., St. L. & P., K. P., all of Mr. Nettleton's K. C. roads, C., St. P., M. & O., C., B. & Q., J., B. & W., L. E. & W., L. D. & S., C. & E. I., C., R. I. & P., &c

N. B.—All work must be made from my standard patterns, which will be promptly and cheerfully furnished.—D. F. V. L.

THE **BEST** AND Cheapest Fence FOR RAILROADS.

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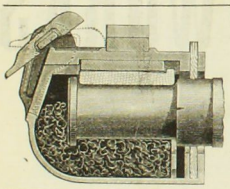

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We respectfully refer you to the following railroads using the Hewitt Cover K. C., St. J. & C. B.; M. R., Ft. S. & G.; C., R. & Q.; C. A. & St. L.; A. T. & S. F.; A. & N.; K. P.; F. & P. M.; D., L. & N.; D. & R. C.; M. C.; H. & St. J.; C. & V.; St. L., I. M. & S.; B. & M. R. (in Neb.); D. P. L., L. & G.; L. E. & W.; L. P. & C.; I. C.; O. C.; St. L., V. & T. H.; St. P. & S. C.; N. P.; C. & E. I.; M. P.

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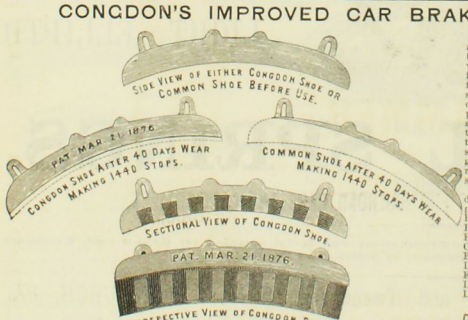

This improvement consists of a shoe, having imbedded in its body of cast iron, pieces of wrought iron, steel, malleable iron, or other suitable metal, fixed therein so as to appear in sections on the wearing surface of the shoe, which increases surprisingly its resistance to wear, and adds materially to the friction or adhesion of the shoe to the surface of the wheel. These shoes are now in extensive and general use on many prominent railroads, and are effecting a saving of over fifty per cent.

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THE
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G. M. SARGENT, General Manager, Grand Pacific Hotel, Chicago, Ill.

THE PERRY SAFETY FREIGHT COUPLING.

About 2,000 of them are at work on the E. & T. H.; C. & E. I.; C. R. I. & P.; T. H. & I. railroads since Dec. 1. The two first named roads have adopted it wholly for their freight cars. This coupling carries its own "Stick" and with it the "Bosses" can couple cars with their "Kids" on. Full size working models at W. Y. PERRY'S (General Agent), 234 South Clark Street, Chicago, Ill.

R. T. CRANE, President. CHAS. R. CRANE, Vice-Pres.
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CRANE BROTHERS MFG. CO.

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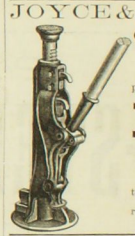

Cor. Canal and Fourth,

DAYTON, O.

We represent here a cut of our Compound

Lever Jack,

OF GREAT POWER.

Its capacity is 12 to 15 tons with two men.

We make out one size, a two-inch round bar.

Height, 29 inches.

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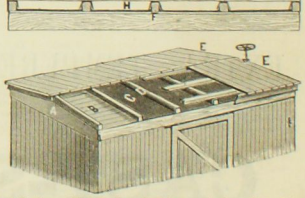

A Carline or Main Rafter. *B* Sub or under boarding. *C* Asphalt Felt, and when on Car painted with imperishable Asphalt paint. *D* Felt Cap or Sub Rafter. *E* Upper board roof. *F* Sub Rafter. *G* Stringers on Sub Rafters. *H* Air Space between the Felt and upper board roof.

This Roof must come into general use by Railway Companies and Manufacturers of Stock and Freight Cars for two reasons, CHEAPNESS and DURABILITY, as it can be furnished on the cars at the cost of a first-class double board roof, and is more durable than the best metallic roof, being thoroughly protected by the upper and lower boarding and the FELT, which is treated in its manufacture with ASPHALT and painted with the same imperishable material, which, not being affected by either *heat* or *cold*, must last the ordinary life of a car.

MANUFACTURED BY

A. P. WINSLOW & CO.,
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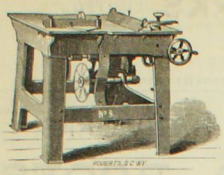


No. 3 Wardwell Saw Bench.

ROLLSTONE MACHINE CO.

Wardwell Saw Benches a specialty

These machines are in use in the car-shops of the Penn. R. R., B. & O., P. W. & B. B. & A. F. R., Mich. Central, and some fifty other of the largest shops in the country

ALSO, A HEAVY BAND SAW FOR CAR WORK

ROTARY, STATIONARY, BED AND BUZZ PLANERS,

And a large number of other machines for car work.

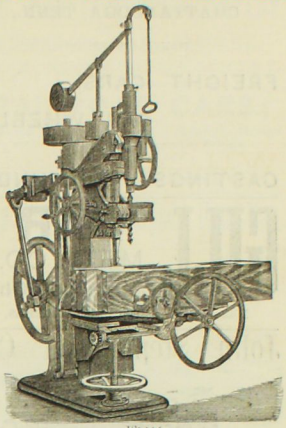
We are dealers in all kinds of Second-Hand

Machinery, Engines, Boilers, Iron and Wood Working Machinery.

Do not buy until you send for new descriptive list, stating just what you want, inclosing stamp.

ROLLSTONE MACHINE CO., FITCHBURG, MASS.

WOOD-WORKING MACHINERY



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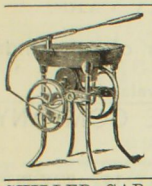


PORTABLE FORGES

THE EMPIRE, THE WESTERN

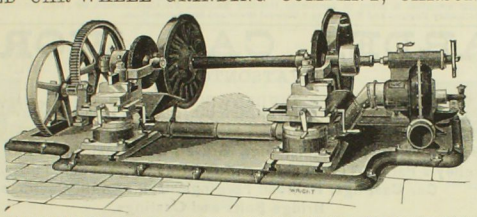
WITHOUT BELTS.	WITH BELTS
DEAD CENTER OR BACK MOTION.	AND LEVER HANDLE. CHEAPEST MADE

SEND FOR CIRCULAR TO

EMPIRE PORTABLE FORGE CO., COHOES, N. Y.

CHILLED CAR-WHEEL GRINDING COMPANY, CARSON NEV.

P. O. BOX 382, CHICAGO.



Patented in United States and Canada by J. H. GOWAN.

A chilled Car Wheel, trued by our method, cannot be excelled by any steel tired wheel. We guarantee that our machine will true ten pairs of car wheels per day of ten hours. Average cost of emery per new wheel is 8 cents, per old wheel, 13 cents. These machines are used by, and reference is made to, the following roads: Chicago & Northwestern; Chicago, Rock Island & Pacific Central Pacific; Denver, South Park & Pacific; Virginia & Truckee; South Pacific Coast; Nevada County.

H. M. YERINGTON, President. J. H. GOWAN, Superintendent.
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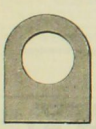
VULCANIZED FIBRE COMPANY,

SOLE MANUFACTURERS OF



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being absolutely unaffected by oil or heat, are far more durable and efficient than Leather, and much cheaper.

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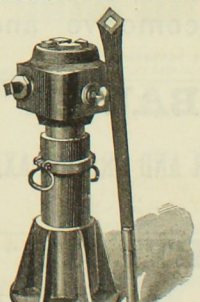
THE "RELIANCE" HYDRAULIC JACK.

SIMPLE IN CONSTRUCTION AND DURABLE,



Being Manufactured of Selected Material in the most thorough manner.

Lowering valve worked by thumb screw, giving operator perfect control in lowering. Pump plunger guided top and bottom, insuring perfect working.

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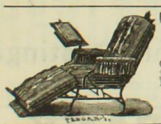

The Marks' Improved Adjustable Folding Chair.

Fully indorsed as the BEST chair ever produced, combining, as it does, a CHAIR, BED, CHILD'S CRIB, INVALID RECLINING and LIBRARY CHAIR, and capable of being adjusted by the occupant to any position desired for ease and comfort. **Marks' Railroad Reclining Chair a Specialty.** Send for catalogue and price-list to

MARKS' ADJUSTABLE FOLDING CHAIR CO.,

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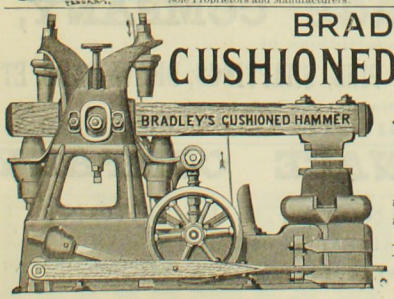


STANDS TO DAY

WITHOUT AN EQUAL.

It approaches nearer the action of the Smith's arm than any hammer in the world.

BRADLEY & COMPANY,

Syracuse, N. Y.

[Established 1832.]

THIS HAMMER

Awarded the First Premium of a Silver Medal AT THE

American Institute Fair, N. Y. City, Nov., 1873.

Superior in every point to any modification of the Trip Hammer,

SIMPLE, POWERFUL, EFFICIENT AND CHEAP.

Four Sizes now being Built.

For Prices and Descriptive circulars, address the manufacturers,

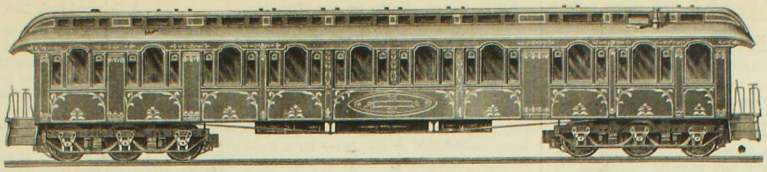
S. C. FORSAITH & CO.

Manchester, N. H.,

Who are also builders of the

Abbe Bolt-Heading Machine.

THE NATIONAL CAR-BUILDER.



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VOLUME XII.
NUMBER 4

APRIL, 1881.

SINGLE NUMBERS, TEN CENTS.
$1.00 PER ANNUM.

Miscellaneous Items.

THE Hibbert draw-bar, and grain car door, are in use on the Ohio & Mississippi road, and give entire satisfaction.

CURRAN & WOLFF, of Chicago, have contracted to furnish two of their patent lumber dryers to the Denver & Rio Grande Railroad Co.

THE business and works of the Culmer Spring Co., of Pittsburg, Pa., have been purchased by the French Spiral Spring Co., limited, of that city.

MR. I. H. RANDALL, Master Mechanic of the Metropolitan Street Railroad Co., of Boston, is building 56 street cars for the road, half of which are open excursion cars. The company built 83 new cars last year, and repaired 416.

THE Adrian shops of the Lake Shore road are very busy on repairs. The company had 18 passenger cars in the Toledo flood, the water in them being 18 in. above the floors. They have been dried by heaters, and 11 are now undergoing repairs.

THE Ohio Central road is building 1,500 freight cars, the journal boxes of which are to have the Hewitt Box Lid Co.'s lids. These lids are also to be put upon a large number of cars that are now being built for the Northern Pacific by the Michigan Car Co. and Haskell & Barker.

THE New York Central & Hudson River road is having 2,800 freight cars built by the Harrisburg Car Co. and the Jackson & Woodin Co., also 10 passenger cars at the Gilbert & Bush Co.'s works, and 20 at the road shops at West Albany. The passenger cars will have Hoit's improved truss-plank, which is placed outside instead of inside the side frame.

MR. ALBERT H. KING and associates have bought from D. B. Grant the Douglas Forge on West Sixteenth street, New York, with all the plant for making hammered car axles. The forge is now running single turn and making 32 axles a day, but the new owners intend to increase the capacity to 125 axles a day. They have some large orders and expect to turn out good work. The new concern is known as the New York Steam Forge Co.

A SEVERE practical test of the Eames duplex automatic brake was recently made on the New York, New Haven and Hartford R. R., between Hartford & Springfield. The train was repeatedly stopped while going at a rate of a mile a minute, and in one instance in 25 seconds after the signal was given from the engine. The train was also divided when under full headway, and during one test the diaphragm upon one of the coaches was cut, and in every case both divisions of the train were stopped in an incredibly short space of time.

MR. D. L. WEAVER, the Master Mechanic of the Eastern Kentucky Railway, writes as follows in regard to the practical working of the Westinghouse air brake on that road: In 1877 fifty cars were equipped with it at a cost of $50 per car, and an additional cost of $1.25 per car for putting it on. The cost of repairs for each car has been $1.12 a year; no failures of the brake have occurred, and the first cost was paid in two years running by one item—the prevention of wheel-sliding; besides saving double the cost of repairs in the diminished number of cattle killed.

THE act making appropriations for the service of the post-office department for the fiscal year ending June 30, 1882, and for other purposes, provides that hereafter when any railroad company fails or refuses to provide railway post-office cars when required by the post-office department, or shall fail or refuse to provide suitable safety-heaters or safety-lamps therefor, with such number of saws and axes to each car for use in case of accident as may be required by the post-office department, such company shall have its pay reduced ten per centum on the existing rates for mail transportation.

DURING 1880, there were built at Altoona for the Pennsylvania R. R. main line, 65 locomotives and 20 for the other roads east of Pittsburg. Also 80 passenger, 8 postal, 6 combination passenger and baggage, 8 express, 225 box, 407 gondola, 43 stock, 13 oil tank, and 41 miscellaneous cars. These were in addition to 3,000 box, and 2,500 gondola coal cars, built for car trust companies. The total equipment of the road at the close of the year consisted of 877 locomotives, 612 passenger, 175 baggage, mail and express, 17,647 freight, and 1,556 road cars. The maintenance of locomotives on main line during the year amounted to $4,003,728, and the maintenance of cars $1,805,747.

A VERY useful improvement in arranging the couplings of air brakes between passenger cars is used on the Eastern R. R. The end of the short air-pipe is bent down under the platform of the car, and instead of a bent nipple a straight one is used which is much easier to attach, and it can be done with less danger of crossing the screw-threads. This method is not only more convenient, but is cheaper than the usual practice, as a common cast iron nipple can be used instead of the bent one made of composition. The winding of the wire to bind the hose on the nipple can be done in a lathe instead of by hand. The improvement was devised by Mr. B. L. Morril, the machine shop foreman.

THE branch of the Peninsular (Detroit) Car Works, at Adrian, Mich., now under the superintendence of Mr. W. B. Rich, formerly of the Lake Shore road, has turned out during the past month seven coal cars a day, on a contract for 950 f[illegible] the Ohio Central, and will in future turn out ten per day. It also has a contract for 100 stock cars for the Lake Shore road, to be built according to specifications furnished. These cars will be as complete and perfect as any of the kind ever built. The Adrian works employ 270 men. The machine shop has recently been enlarged by an addition of 75×100 feet, and new machinery has been put in. The working force will soon be largely increased.

MR. J. D. BILLINGS, the Master Car-Builder of the Eastern Railroad, Salem, Mass., is building eight new passenger coaches, the inside finishing of which is to be solid walnut, with head-linings in light colors and of four different designs. The windows, 18 on a side, will be extra large and have single sashes with 20 × 34 glass. Instead of slat blinds, cloth curtains, mounted on Hartshorn rollers in the Pullman style, will be used. Each car will seat 70 persons. The seat-ends are the first lot made of Buntin's new Eastlake pattern. The cars are framed, braced and trussed in the usual way. A curious relic of construction may be seen at these shops, consisting of a piece of the panel of a car which was stove in after 14 years service, and which had been painted seven times without removing the previous coats. One edge of the fragment has been planed to a bevel, showing the original coat and the seven subsequent ones, and with no sign of crack or scale. The back of the panel had originally two coats of common mineral paint. The car was never rubbed up, and each repainting consisted of two coats of yellow with a brown stripe, and two coats of finishing varnish.

THE GILBERT & BUSH Co., of Troy, N. Y., have just shipped three coaches and one drawing-room car to a narrow gauge government road in Brazil, also 11 passenger and combination cars to Mexico (7 to the Sonora road and 4 to the Mexican Central), and 4 Tiffany refrigerator cars to Australia. They are built in sections, the ends in one, the sides in three, and the roofs in six. When a car is completed, the bolts, rods and screws are taken out, and the parts packed for shipment. The two outside sills are bolted together with the painted sides facing each other, also the two truss-planks, and the center and intermediate sills in the same way. The long rods and under-flooring are put up in bundles. The 4 cars for Mexico were packed as follows: the body sections in 40 boxes, and the trimmings and seats in 20 boxes. The trucks were taken apart, the upper framing being kept together; each pair of wheels with their axles going as one piece. The rest of the trucks, together with the iron work of the car bodies, fill 24 boxes more, making 84 boxes in all. There were also 220 pieces, 126 bundles and 4 kegs, making a total of 434 packages, weighing gross about 185,000 lbs., or 150,000 lbs. net, or 37,500 lbs. for each car. The company is building some new Wagner cars, which are 70 ft. 6 in. long, the longest they have ever built. The side frames have a new style of trussing, there are no oval panels on the outside, and the windows are square. The outside ground color is chocolate, with elaborate and showy decoration. In the inside finish, the pier panels between the windows are bordered with two pilasters running from the lower wainscot rail to the roof, and uniting with

corresponding bands in the oak ceiling so as to make this feature of the finish continuous upon sides and roof.

A NEW company has been organized to build car works at Marietta, O. Its capital stock is $50,000.

THE Woodruff Parlor & Sleeping Car Co. has ordered 18 new cars, two from the Barney & Smith Manufacturing Co., at Dayton, O., and the other 16 from Wilmington.

THE Georgia Railroad Co. has bought the old Markham rolling mill property in Atlanta, Ga., and will build new car shops there.

Cost of Freight and Passenger Transportation.

The following is an extract from the argument of Mr. E. P. Alexander upon railway legislation, made before a committee of the legislature of Alabama :

"In this connection there are two ideas which are often discussed in the papers and magazines of the day, upon which I wish to offer a few words. The first is that it would be a very simple matter to make the railroads adopt a system of keeping accounts which should show what it costs to move a ton of freight, or a passenger, one mile, and then let each road charge that amount with a reasonable profit and no more, and be done with it. The idea is so charmingly simple that it is no wonder it beguiles many persons who have no practical experience in railroad matters; but I find it hard to condense within my limits a sufficient idea of its utter absurdity and impracticability.

"Kindred inquiries in other branches of business would be : What does it cost a doctor to prescribe for a headache, a dentist to pull a tooth, a lawyer to give an opinion, an editor to write an editorial, a merchant to sell a pair of shoes, a freedman to pick 100 pounds of cotton, a farmer for his hen to lay a dozen eggs, or, the United States Government to carry a paper of seeds from Mobile to Montgomery? Try to analyze fully and minutely these questions, and imagine an attempt to regulate prices for such services on the results. Even far less sensible and satisfactory to the community would be an attempt to regulate railroad tariffs on any such basis.

"As a single illustration of a number of difficulties which would be met, I instance the utter impossibility of satisfactorily dividing many of the current expenses of railroad maintenance and management, and assigning its accurate proportion to each of the four ordinary sources of revenue, freight, passengers, express and mail. What proportions of the salaries of president, superintendent, comptroller, attorney and all employés, from general officers down to track hands and car greasers, shall be allotted to each of the four departments as the actual expense of conducting it. I am aware that some roads try to do this, but the divisions made are very various, and are all arbitrary. One mode of division, which has more plausibility than any other, is to divide these salaries in proportion to the revenues from each department. But a moment's reflection will show that this division is really as arbitrary as any other, for the comparative revenues fluctuate every day, every month, and every year. And mail or express service, for instance, might be discontinued altogether, and many of these expenses not be decreased a cent. Then in the renewal of a cross-tie which will last somewhere from six to ten years, a rail which may last from fifteen to twenty-five years, or an iron bridge which may last fifty to a hundred years, the future proportions of business must be guessed at. With so much guessing in the problem, the very few expenses, which could be divided satisfactorily, would have no value. The result would be about as useful and reliable as the weight of a stack of hay arrived at by weighing one armful and guessing at the rest."

Native Cabinet Woods for Car Finishing.

It is not many years since it was thought that a mahogany or rosewood finish was alone adapted to the better class of passenger cars, although later black walnut superseded the former, and still later oak predominated. At present, there is a growing disposition to use white ash as a base, ornamented with birch, either the white of the variety *populifolias*, or the cherry birch (known also by the terms black, sweet and mahogany), which is of a reddish color, close-grained, compact and moderately hard, susceptible of a brilliant polish. The yellow or gray birch, found from Newfoundland to the western shores of Lake Superior, and as far south as North Carolina, is also a valuable species, the wood of which resembles, and by some is thought to surpass, the cherry birch, while growing to so large a size (three to four feet in diameter) as to be of great value as a commercial wood.

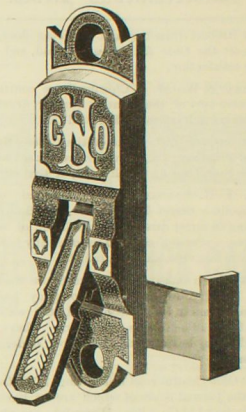
The extensive car building firm of Gilbert, Bush & Co. is adopting ash and birch quite extensively in car building, and has recently supplied the Flint & Pere Marquette Railroad with one or more full passenger trains, which present a peculiar and, at first sight, novel appearance in their richness, notwithstanding they are extremely plain, with the absence of that heavy luxuriousness which has become so common in rail cars as to be oppressive. On entering these cars it is difficult at first to say whether one likes them or not. The side walls are wholly of natural wood, the well-developed grain of oiled and varnished white ash being relieved by narrow panels of cherry birch. The window frames are of ash; the sash of red birch, and the screens or blinds of white birch. The work upon the panels of the sides and the long panels below the ceiling is extremely plain, relieved only by a narrow carved streak or line. The contrast presented by the light-colored ash and birch, relieved by the red of the cherry birch, is peculiar, but pleasant, and to the summer traveler the cars will no doubt be more pleasing and restful than in the winter season.

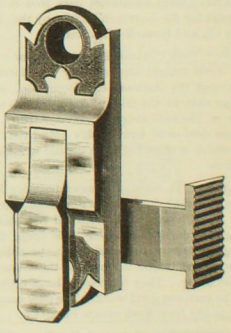
Birch has not, to any extent, been introduced in the fine arts of this country, but its closeness of grain, lightness of specific gravity and richness of finish, bring it into the category of uses for which cherry has been largely employed in the past, and explains to us the favor with which it has been received by our English cousins, as exhibited in the large extent of their importations from America. Of the particular cars to which reference has been made, the peculiar beauty which has been developed by the sawyer as the log passed through the mill, supplemented by the skill of the workman in preparing the boards for the oil and varnish finish, render the white ash a constant pleasure to the traveler of æsthetic taste, who will never tire of studying the various convolutions of grain. White ash is as yet reasonably plenty, of the kind which can be adapted to inside finish, while it may be said to have become somewhat difficult to obtain that which is adapted to wagon and agricultural work, and it is undeniable that the quantity readily obtainable grows beautifully less each year.

There is rapidly developing, also, a taste for the utilization of the red oak for the interior decoration of cars, and a specimen which recently came under the writer's observation was in appearance and finish fully the equal of white ash. The neglect with which red oak has hitherto been treated has had a direct tendency to its protection, and there is no forest growth in this country now more plentiful, nor yet one which has met with greater favor than the future will develop in its use. Relieved with panels of cherry birch, the red oak is fully the equal of white ash, in such uses as pertain to car building or house ornamentation.—*Northwestern Lumberman.*

A Universal Sash Lock.

The cuts illustrate a new style of sash lock designed for the windows of houses and railroad cars. It is manufactured by the Universal Sash Lock Co., of Albany, N. Y., and is the invention of Mr. L. C. Strong, of that company. The mechanism is not shown in the cuts. It is extremely simple, however, and consists of a thumb-piece which acts upon a sliding-bar or fastener by means of an eccentric disc. It has several important advantages over other devices for holding a sash in any desired position. It is set by pressing on the thumb-piece, and will hold a window locked until the thumb-piece is lifted ; prevents rattling, is never out of order, is easily attached to the sash without weakening or defacing it, and requires no holes to be cut in casings nor any

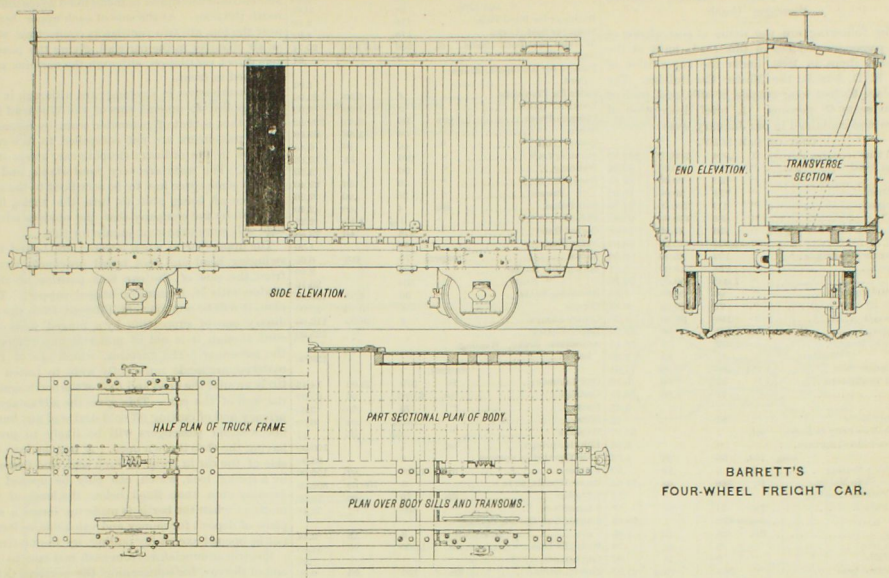




attachments thereto. It is in fact a very cheap, strong and durable device, and will give satisfaction wherever it is used. The larger cut represents the bronze metal style of finish, and the smaller one the polished nickel style.

THE Chicago, Rock Island & Pacific shops in Chicago are building ten handsome passenger cars and a dining car on a new plan.

Mr. W. O. WEBBER, for some time past in charge of the Chicago, Burlington & Quincy laboratory in Aurora, Ill., has resigned, and will be made Superintendent of the Allen paper car-wheel works in Chicago.



BARRETT'S
FOUR-WHEEL FREIGHT CAR.

THE engravings illustrate an improved 4-wheel freight car, designed and patented by Mr. Charles Barrett, of Somerville, Mass. In its peculiarities of construction it differs very materially from other cars of this class, the aim of the inventor being to secure an easier draft, diminished wear and friction of the working parts, a better adjustment of load to inequalities of track, easier curving, a full maximum capacity, and economical maintenance.

The car body is 21 ft. long and 8 ft. 6 in. wide, outside; wheel base, 13 ft. 6 in.; diameter of journals, 4¾ in.; journals bearings 4¾ by 7½ in.; weight of car, about 13,000 lbs.

The pedestals, which are placed on the inside of the wheel piece, and secured thereto by nine bolts, as shown, are much wider than usual, and sufficiently strong to resist the strains incident to curving without the aid of tie-bars. The weight of car-body and load rests upon 12 spiral springs 4¼ in. in diameter—three springs to each pedestal—the middle springs being longer than the other two, so that the full weight bears upon the shorter springs only when the car is loaded.

The journals being smooth, or free rather, from the peripheral grooves in which the ordinary bearings rest, there is no wear of the bearings from the end-thrusts of journals in curving, nor is there any play between the bearings and journal boxes, the axles being held at right angles with the truck frame.

The cross-ties are placed both above and below the wheel pieces, and are held by through bolts. The draw-timbers are continuous, and instead of being below the truck frame, are on a line with it, and between the upper and lower cross-ties, thus distributing the drawing and buffing strains equally as well as directly against the journals. The car body is supported by four transoms, as shown. The brakes are hung from the truck.

A car constructed upon this principle, but somewhat smaller in general dimensions, was built at the shops of the Boston & Lowell Railroad more than a year ago, its length being 20 ft., wheel base 12 ft., journals 4½ in. diameter, bearings 8 × 4½, wheels 540 lbs. each, total weight of car about 14,000 lbs. This car has been running continously, and sometimes with 12-ton loads, traverses with the greatest ease curves of 100 feet radius, and has in all respects proved a serviceable and economical car.

The noticeable points as shown in the cuts are the long wheel base, the extremely short overhang at the ends, and great strength of pedestals. The arrangement of the springs also secures adhesion of all the wheels to the rails at points that are above or below the proper level, and prevents a concentration of the weight at opposite corners and a tilting of the two other corners, as is the case with 8-wheel cars with arch-bars rigidly attached to the journal boxes, while the springs rest upon beams supported upon the truck frame.

The important points in this construction can not be fully understood without detailed drawings of pedestal, journal box, bearings, etc., and which we have been obliged to defer on account of the unsuitable size of the cuts furnished and lack of space.

Mr. P. H. Dudley's Railway Inspection Car.

The inspection car used by Mr. P. H. Dudley for ascertaining the conditions of track, variations in draft power, consumption of fuel, etc., contains a very ingenious and complicated piece of machinery by which the work is done, the chief features of which are described as follows by a reporter of the Pittsfield (Mass.) *Sun*:

"A band of plain paper, about 20 inches wide, is fed from a roll into the machine, passing under a complex set of overflowing pens. For every 50 feet of track passed over by the car this paper band moves one inch, thereby taking eight and a fraction feet for a mile of road. By carefully constructed and adjusted machinery, connected with the wheels of the car, the operator obtains upon the paper a perfect chart of every foot of the road. The instrument shows: First, the power required to draw the train; second, a pen marks on the paper the seconds of time in transit; third, another pen marks every tenth second in the same way; fourth, still another pen marks each minute. Then comes a schedule showing the distribution of coal used by the engine; the amount of water used by the engine. A perfect diagram of the track is delineated, showing all curves, grades, etc.; the number of revolutions which the driving-wheels make in a minute or mile, or parts of these two. The location of the mile posts are shown, as also the bridges; the work done by the engine, so given that the foot-pounds of work can be readily ascertained by multiplying the ratios; the velocity and resistance of the wind. All these are plainly and accurately shown upon the diagram. When used to inspect the track, the machine shows the surface of each rail, giving the condition of each joint, frog, etc., and shows at a glance whether the rails are fitted perfectly true, or the least trifle out of place, or if one is a hair's breadth higher than another. The elevation of the rail on a curve is shown, and a machine has just been added, which Mr. Dudley invented, giving the exact depression of the rails from a true line. Another section of the chart gives the exact movements of the engineer when the brakes are applied, when steam is put on, and the power required to start and stop the train. Mr. Dudley examines a road in this way, hands his chart to the superintendent, and that gentleman knows at once just where to make repairs and all other needful particulars.

"Besides this workroom, there are a nicely furnished library and parlor, a dining-room, kitchen, bedroom, and storeroom. All this in a commonsized passenger coach, and in it Mr. and Mrs. Dudley have lived for the past four years, traveling all over the United States."

Detailed Cost of a Boston & Albany Railroad Passenger Coach.

The following are the items of cost of one of the passenger coaches of this road, built at the Allston shops in 1880, under the supervision of Mr. F. D. Adams, the Master Car-Builder. The cars are 55 feet long outside of sills, and each of them seats 68 persons. A brief description of them was contained in our January issue:

COST OF CAR BODY.

Hard Pine	ft.	1,904	$20.00	$49.50
White Wood	"	1,241	40.00	49.64
Oak	"	681	30.00	20.43
Chestnut	"	751	20.00	15.02
Mahogany	"	111	200.00	22.20
"	"	636	150.00	95.40
Pine	"	252	40.00	10.08
"	"	1,322	25.00	33.05
Poplar for Blind Slats	"	100	25.00	2.50
Spruce	"	274	19.00	5.21
Ash	"	1,803	50.00	90.15
" Burl Veneers	"	60	30.00	1.80
Maple "	"	71	30.00	3.55
Rosewood	"	140	30.00	4.20
Castings	lbs.	924	.03	27.72
Wrought Iron	"	2,272	.05	68.16
" " Washers	"	25	.05	1.25
42 Window Sills	"	296	.06	17.64
8 End Ventilators	"	85	.06	5.10
Nuts	"	74	.05	3.70
Chain				1.21
Carriage Bolts		81		.71
Double Iron Body Bolsters	set.	1		36.27
Draw-bar Hook Springs		6		8.50
2 " " " long	lbs.	66	.07	4.62
Iron Wire Netting	yds.	5	.18	.90
Rubber Strip Molding	ft.	388	.03	11.64
Wire Pins for Molding				.75
Lead Pipe	lbs.	11	.07	.77
Tin	sheets	402		28.94
Solder	lbs.	28	.16	4.48
Russia Iron	"	6	.12	.72
Roof Nails	"	9	.11	.99
Galvanized Iron	"	205	10½	21.53
H. C. Iron	"	10	.05½	.55
Copper Tacks	papers.	6	.30	1.80
6-oz. "	"	3		.54
Sheet Copper	lbs.	25	.30	7.50
" Zinc	"	27	.07½	2.02
Hood Iron	"	100	.05½	5.50
Paint Stock				117.17
Dome Sash Glass	lights	38	1.50	60.92
Saloon Door "	"	1		7.24
Ventilator "	"	4	1.26	5.04
Door "	"	2	3.05	6.10
Window " 18x20	"	42	.56	23.52
Five-in. Globe Ventilators		18	1.00	18.00
Four " " "		4	.70	2.80
Hitchcock Ventilating Registers		16	2.00	32.00
Three Wire Window Screens	yds.	11⅛	1.25	14.17
Brown Scrimp	"	83	.12¼	10.17
Glue	lbs.	46	.16	7.36
84 Steel Sash Springs	"	5½	.14	.77
168 " Blind "	"	8	.14	1.12
Brass King-Bolt Plates		2	.60	1.20
Stove Pipe Rings		2		3.40
Urinal				4.40
Hopper				4.65
Lip Gilt Molding	ft.	325	.06	19.50
Stencil Gilt "	"	250	.07	17.50
" " "	"	110	.12	13.20
Corner " "	"	230	.03	6.90
Sweeps				9.80
Escutcheon Pins		2	.80	1.60
Head-lining Cloth	yds.	61⅛	.50	30.67
" " Nails	"		.08	6.56
Nails				30.26
Screws, etc				2.52
Lag Screws		63	.04	1.45
Copper Rivets	lbs.	3 10-16	.40	.84
Pulleys in Hood		2	.42	1.32
Cast-Iron Ventilator Frames		16		.12
Bolts		24		.80
Catches for Heater Doors		2	.40	1.10
Pivots, etc., for Ventilator Sashes				.50
Urinal Handle				.30
Butts for Urinal and Hopper				17.40
" Doors		15		5.50
Saloon Door, Latch and Knob				15.00
Outside Door, " "		2	7.50	16.00
Bell Cord Pendants		8		2.00
Bronze Notice Plates		2	1.00	.84
" Bell Cord Bushings				80.00
" Basket Racks		16	5.00	12.84
" Mitre Joints				5.25
" Sash Lifts		42		10.50
" and Locks		42		9.63
" Blind Pulls		42		9.80
" " " and Lifts		84		2.36
Bushings for Blind Pulls		118		4.92
Stops for Sash Locks		118		20.74
64 Metal Seat-Back Bands	ft.	256	0.8 1-10	.81
Sash Pulls		9		1.00
Pulleys for Automatic Brake-Cord				20.00
Gates for Platforms		4	5.00	2.00
Locks for Gates		2	1.00	227.52
Crimson Plush	yds.	96	2.37	67.68
Green "	"	36	1.88	6.40
Cotton Cloth	"	40	.16	13.86
Seaming Lace	"	126	.11	3.30
Webbing	"	96		7.20
Duck, No. 3	"	40	.56	2.40
" Brown	"	36	.20	1.50
Ball Twine	lbs.	4	.60	2.25
Thread	"	1½	1.50	73.88
Curled Hair	"	378	.46	1.00
Nails, Plush		160		6.00
Tacks	papers	75	0.8	8.00
Springs for Backs		384		23.10
" " Seats		504		136.00
Revolving Seats		32	4.25	15.00
Corner "		4	3.75	112.00
Centre Lamps		4	28.00	325.00
Baker Heater				138.00
Automatic Brake, Westinghouse				

TRUCKS.

Oak Lumber	ft.	579	25.00	14.48
Castings	lbs.	2,102½	.03	63.07
Nuts	"	73	.05	3.65
Bolts	"	152¼	.04	6.09
Washers	"	2¼	.05	.11
Elliptic Springs	set	1		100.00
Vose Equalizing Springs		8		85.00
4 Axles	lbs.	1,528	.07	106.96
Paper Wheels, 42 in		8	100.00	800.00
8 Brasses	lbs.	78	.25	19.50
4 Equalizers	"	858		52.48
Journal-box Covers, Spring, etc		8	.28	2.24
Wrought Iron	lbs.	1,065	.03	31.95
Lag Screws				.92
Check Chains	lbs.	120	.05	6.00
Screws				.50
Rubber Pipe				.50
8 Brake Springs	lbs.	46	.07	3.22

Cost of Material	$3,845.60
Cost of Labor	1,753.83
Shop Expenses	112.90
Total Cost of Car	$5,712.33

RECAPITULATION.

Lumber	$402.73
Iron, etc	263.51
Paint Stock	117.17
Glass	102.82
Furnishings, etc	472.31
Upholstery	464.99
Miscellaneous	720.00
Trucks	1,296.07
Cost of Material	$3,845.60
" Labor	1,753.83
Shop expenses	112.90
Total Cost of Car	$5,712.33

New Woodruff Sleeping Cars.

The *Railway Age* contains the following description of two very handsome cars named "Saratoga" and "Newport," recently built for the Woodruff Sleeping Car Company by the Barney & Smith Manufacturing Company, of Dayton, Ohio:

The cars are 63 ft. long, besides the platforms, 8 ft. 9 in. wide, and weigh about 58,000 pounds, including the six-wheeled trucks, which are of the master car-builders' standard. They contain 12 sections and a good-sized drawing room. The interior finish is mainly of burl ash and walnut, finely polished, making a very pretty contrast. The ceiling is of white oak of three thicknesses, with the grain alternating in each layer, and glued together to prevent splitting. The ceiling is artistically painted with flowers and vines. The under surface of the upper berths is carved, giving, when the berth is up, a graceful appearance to the ceiling, while less space than in the ordinary car is needed for storing bedding, from the fact that in the Woodruff car the mattresses and curtains are stored in metal lined boxes underneath the floor. At the side of each upper berth, near the top, are two ventilators connecting with an air chamber in the car wall, giving the passengers direct ventilation, although the curtains may be closed in front.

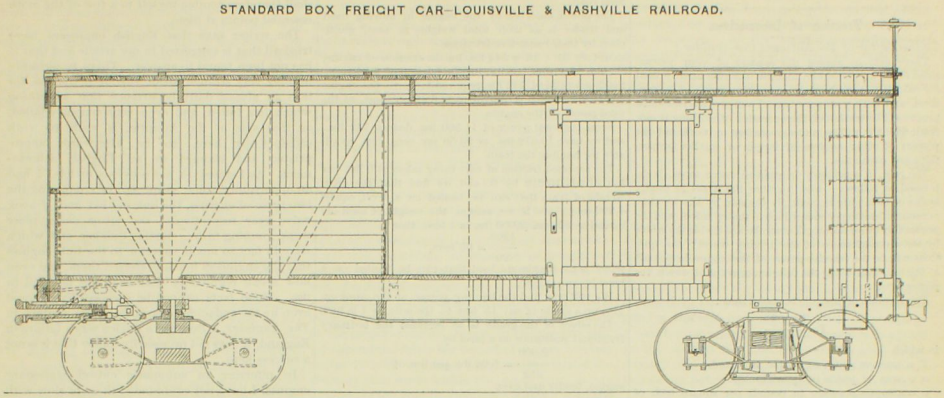
A feature novel in sleeping cars, although it has been applied to several cars of the Woodruff line before this, is that of reversible seats, by means of which passengers are not compelled to face each other as in the ordinary sleeping car, unless it is desired. The seats are very comfortable, and although some space has to be sacrificed to the convenience of being able to turn the backs, it is thought by the company that the obvious advantage will more than compensate for this.

The upper berths when lowered are bolted to a swinging head and foot board previously swung from the side of the car to a position at right angles with it, forming a hinged support. This plan, it will be seen, is very different from the ordinary one of supporting by a hinged joint or a cord, though it is not of material importance to the passenger. The curtains, which are of rich material, are made sufficiently wide to fasten entirely around the head and foot of the berth against the wall of the car. This gives the advantage of privacy and of cutting off cold drafts of air, but in hot weather passengers will be likely to prefer having the ends thrown open. A box let into the side of the car in front of each seat, and fastened by a spring lock, which can only be opened by pressing on a knob fixed below the level of the mattress when the berth is made up, forms a safe place of deposit for money and valuables, as it cannot be opened except by pulling up the mattress.

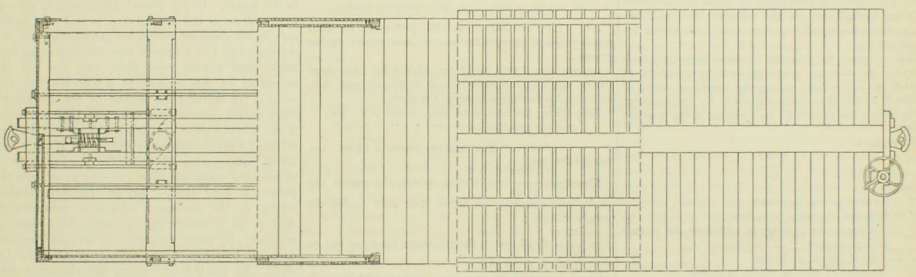
Electric annunciators from each seat run to the end of the car, for summoning the porter. Other peculiarities of these cars are their rounded ends, upper berth windows, and fixed thermometers at either end to enable the porter to regulate the temperature. The rotunda at each end forms a comfortable smoking room, which can be entirely shut off from the rest of the car. The ventilation is by a device which Mr. C. E. Lucas, the inventor and division superintendent of the company, claims to have special advantages. Instead of the deck lights opening in, as they do upon many cars, they open outwardly in alternate directions, only one-half being opened at the same time and in a direction opposite to that in which the car is moving. On the outside of the ventilator there is a V-shaped cup of iron, which assists in concentrating the draft from the front of the car and causing it to rush past the opening, thus sucking out the impure air from within. Over and below are galvanized iron flanged shields, preventing the ingress of water or cinders. It will be seen that the theory of this ventilator is to prevent direct drafts upon the passengers and to relieve the car by compelling an outward current of air. It is claimed that this plan, while excluding cinders, secures complete ventilation.

THE Delaware & Hudson Canal Co. are putting in the inside fire-box sheets of locomotives in two pieces, the upper one smooth and the lower one corrugated. Allen paper wheels (33 in.) are also being put in their engine and passenger car trucks. They are building at their Green Island and Oneonta shops 200 four-wheel 12-ton gondolas, which will have the Hoit sectional draw-bars, and King's patent trucks for one pair of wheels. This truck has been adopted after the test of a year's service, and may be described as oscillating and center-bearing, with side springs. The company has also received from the Dickson Locomotive Works, at Scranton, Pa., 4 Mogul locomotives, being part of a lot that are now being built at those works. They have 18×24 cylinders, and 55⅝ inch drivers, and weigh 78,500 lbs.

STANDARD BOX FREIGHT CAR—LOUISVILLE & NASHVILLE RAILROAD.



Side Elevation and Section.



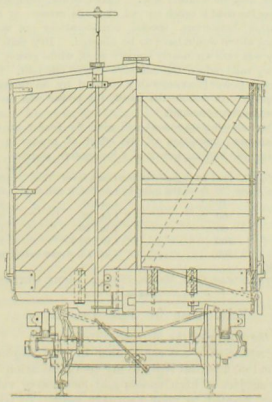
Floor Frame, Floor and Roof.

GENERAL DIMENSIONS.

Length, outside of siding	30 ft.	0 in.
Length, inside of lining	29	4¼
Width, outside of siding	8	7¾
Width of door opening in the clear	5	6
Height of lining, including belt-rail	3	0
Top of sill to under side of plate	6	2
Outside of end siding to center of bolster	4	6
Between ce ter sills	—	10
Between center and intermediate sills	1	9½
Between centers of bolsters	21	0
Between centers of center ties	6	3

BODY TIMBERS (FINISHED SIZE).

Side sills	4½ x 9	in. x 29 ft.	10½ in.	Yel. pine.
Intermediate sills	4 x 9	x 29	3½	"
Center sills	4 x 9	x 29	3½	Wh. oak.
End sills	5 x 9	x 8	0½	"
Bolsters	4 x12	x 8	6	"
Center ties	4 x 8	x 8	6	"
Draft timbers	4 x 8	x 4	6¾	"
Dead-woods	4 x10	x 2	2	"
Side plates	2½ x 9½	x 29	10½	"
End plates	2¾x12¼	x 8	3	"
Corner posts	3 x 5	x 6	5	"
Door posts	2¾x 4	x 6	5	"
Intermediate posts	2 x 3½	x 6	5	"
End posts	2 x 4	x 6	5	"
Side braces	2 x 3½	x 7	0	"
End braces	2 x 4	x 7	1	"
Ladder posts	2 x 3½	x 6	2	"
Carlines	1¾x 9¾	x 8	3	"
Ridge pole (center)	2¼x 5	x 29	10½	"
Purlines	1¾x 3	x 29	10½	"
Belt-rail	2 x 3	x 64	0	"
Door strips	1¾x 2½	x 6	6	"w.p.
Running-board	2¼x12	x 30	2	Yel. pop. or
Door pieces	1¾x 7	x —	—	Wh. oak.



End Elevation and Section.

Siding and lining ¾ in. white or yellow pine or yellow poplar—745 sup. feet, net. Roofing 1¾ in. clear poplar or white pine, to project 3 in. beyond siding or sides, and 2¾ in. beyond siding or ends, and have gutter of galvanized iron—280 sup. feet, net. Flooring of oak 1¾ in. or yellow pine 1¼ in. dressed on tcp and matched, no piece to be over 9 in. wide.

MATERIAL IN BODY.

Lumber (finished), 3,278 ft. b. m.; cast iron, 1,075½ lbs.; wrought iron, 956½ lbs.; bolts, nuts and washers, 546 lbs.; draw-springs, 44 lbs.

MATERIAL IN TRUCKS.

Top bolsters	7¾x14	in. x	7 ft.	7 in.	Wh. oak.
Bottom bolsters	5¾x14	x	7	7	"
Brake beams	4 x 7	x	5	11½	"
Cross pieces	3 x 6	x	1	4	"
Lumber in trucks					262 ft. b. m.
Castings " "					5,380 lbs.
Wrought iron in trucks					2,260 "
Bolts, nuts and washers					203 "
Brasses					96 "
Bolster springs					264 "

Wheels, 33 in.; hammered scrap axles; wheel seat, 4 13-16 in.; center, 4 in.; no shoulder behind wheels; center to center of oil box holes, 6¼ in. Journals, 3¾x7 in. Wheel base, 5 ft. 1 in. Spiral springs, 5½x7 in. Brakes hung inside.

Weight of car, 20,000 lbs.; capacity, 36,000 lbs.

A full illustration of the standard freight truck of the road is deferred until our next issue.

THE Providence & Springfield railroad has adopted the New England Car Co.'s screw-lever dump car, and the Portland Co., Portland, Me., are building five cars with this improvement, fo the Maine Central road.

Communications.

Traction of Locomotives.

To the Editor of the National Car-Builder:

There may be among the readers of your journal some few who would like to know the rule usually used for calculating the haulage or tractive power of locomotives, and with your permission I will give the rule and a practical illustration of the operation of working it out, from which it will be an easy matter to work out the powers of other engines of larger or smaller proportions and capacities.

The rule, in a primary or comprehensive sense, is expressed as follows: Add together the areas in square inches of both pistons, multiply the sum by the average pressure of steam per square inch in the cylinders, and the product by twice the length of stroke, and divide the whole by the circumference of the driving wheel; the quotient will be the tractive power of the engine in pounds at the rail, that being the fulcrum or point at which the power acts.

The formula of the rule is stated thus:

$$T = \frac{2\,a\,p\,2\,s}{C}$$

in which

T = tractive power of engine, in pounds.
a = area of piston in square inches.
p = average pressure in pounds per square inch of steam in cylinders.
s = stroke of piston in inches.
C = circumference of driving wheel in inches.

By substitution and reduction of terms in the above rule and formula, we get the following rule and formula, which are equally correct and much easier for application:

Rule.—Square the diameter of piston in inches, multiply by the average steam pressure in cylinders, in pounds per square inch, and by the length of stroke of piston in inches, then divide the whole by the diameter of driving wheel in inches; the quotient is the tractive power.

Formula—

$$T = \frac{d^2\,p\,s}{D}$$

in which

T = tractive power, in pounds.
d = diameter of piston, in inches.
p = average steam pressure in cylinders, in pounds per square inch.
s = stroke of piston, in inches.
D = diameter of driving wheel, in inches.

Note.—The stroke of piston and diameter of driving wheel may be taken in feet, if the dimensions are convenient, but both terms must be taken alike, either in feet or inches, as the case may be.

As an illustration of this rule, let us take the following example: To find the tractive power of an engine:

Cylinders = 17 inches diameter.
Stroke of piston = 2 feet in length.
Driving wheel = 5 feet diameter.
Average steam pressure in cylinders = 100 pounds per square inch.

Then by our formula, we find that the tractive power =

$$\frac{17 \times 17 \times 100 \times 2}{5} = 11{,}560 \text{ lbs.}$$

The weight of an engine on its driving wheels should bear a relative comparison with its tractive power, and the adhesive power must always be in excess of the tractive power, otherwise the wheels will slip on the rails; therefore the assumed weight of our model engine must be taken accordingly.

An ordinary eight-wheeled locomotive of the American type, with 17-inch cylinders, will weigh, in working order, about 34 tons, of which, probably, about 24 tons will be on the drivers, and the balance on the truck. The weight of its tender will be about 22 tons in working order.

The adhesive power of the wheels on dry rails may be taken approximately at one-fourth of their insistent weight, therefore 24 tons divided by 4 will give 6 tons, or 12,000 pounds, as the adhesive power of the drivers, which is slightly in excess of the tractive power, as required. Then, assuming the working friction of engine and machinery when running from 15 to 20 miles an hour at 16 pounds per ton, and the rolling friction of tender and cars at 9 pounds per ton, we will with the above data find the hauling power of the engine on a level road.

The power absorbed by the engine in moving itself and tender is as their total weights in tons, multiplied by their respective frictions—

therefore $34 \times 16 = 544$ lbs. for the friction of engine,
and $22 \times 9 = 198$ lbs. for the friction of tender,

making a total of 742 lbs. required to move the engine and tender, which is equivalent to 6·42 per cent. of the total power of the engine.

From the total power of 11,560 lbs. deduct 742 lbs., and we have 10,818 lbs., or 93·58 per cent. left, available for hauling the train.

The assumed friction of cars being taken at 9 lbs. per ton, divide 10,818 by 9, and we find that the gross weight of train that can be hauled on a level, equals 1,202 tons; and if we assume the weight of each car loaded as 20 tons (2,000 lbs. = 1 ton), then

$$\frac{1202}{20} = 60 \text{ cars,}$$

which is the maximum load that can be hauled on a level by our engine.

We will now find the hauling power of the same engine up a grade of say 15 feet to the mile, or 1 in 352.

The effect of the grade is to increase the ordinary frictional resistance on a level by

$$\frac{2{,}000}{352} = 5{\cdot}68 \text{ lbs. per ton of}$$

engine, tender and cars.

Hence,

$34 \times 16 = 544$ lbs. = friction of engine.
$34 \times 5{\cdot}68 = 193$ " = gravitation of engine.
$22 \times 9 = 198$ " = friction of tender.
$22 \times 5{\cdot}68 = 125$ " = gravitation of tender.

Total = 1060 " = 9·17 per cent. of total power required to move the engine and tender up the grade.

Deduct this 1,060 lbs. from 11,560 lbs., the total power, and we have 10,500 lbs, or 90·83 per cent. left, available for hauling a train up the grade.

Then taking the friction of cars per ton = 9 lbs.,
and the gravitation " " " " = 5·68 "

The total resistance = 14·68 lbs. per ton for cars,

Therefore, $\frac{10{,}500}{14{\cdot}68} = 715$ tons which the engine can haul; and assuming as before that each loaded car weighs 20 tons:

then $\frac{715}{20} = 35{\cdot}75$ cars as the maximum load that can be hauled up the given grade.

This load is only 59½ per cent. of that which the same engine can haul on a level.

In the above calculations it is assumed that the road is free from sharp curves, the rails dry and in good order, and the weather fine. Under other conditions, where the road is much curved, the rails greasy, or the weather boisterous, special considerations not mentioned above would have to be allowed. Dry rails or very wet rails are nearly equally good, while greasy or snowy rails reduce the adhesive power one-half. The tractive power is considerably reduced by an increase of speed. At double the speed, the power will be reduced nearly one-half.

The following statement will give the reader an approximate conception of the effect of grades in reducing the hauling power of a locomotive engine.

	Per ct.
Taking the load an engine can haul on a level	100
On a grade 20 ft. to the mile, or 1 in 264, it will haul	51
" " 40 " " " 1 in 134, " "	34½
" " 60 " " " 1 in 88, " "	25
" " 80 " " " 1 in 66, " "	19
" " 100 " " " 1 in 52·8, " "	15
" " 400 " " " 1 in 13, it can barely haul itself.	

ST. THOMAS, ONT., March, 1881. JOHN ORTTON.

Valve Gear for Fast Locomotives.

To the Editor of the National Car-Builder:

I notice in a recent number of *The Engineer* (London) a partial reply to my communication on the subject of high speeds and locomotive valve gear, printed in your February issue. To point out all the unwarranted assumptions and distortion of facts contained in this reply would require more time than I can now devote to it, and occupy more space than you can conveniently spare. I shall therefore confine myself to a few of the more essential points at issue.

The writer says that English engineers have tried all that is suggested in my article and that it has not been found to answer. There is certainly nothing very strange about this, if it were so, for it is an almost daily occurrence that *something* which has failed, and even conspicuously failed, on that side of the Atlantic, is made to work satisfactorily here, to be afterwards appropriated and claimed as an English achievement. As I stated in my previous article, I had an opportunity some years ago of comparing the two types of engines, the link motion and V-hook valve gear respectively, the latter doing more work, running faster, starting quicker, and which were in fact so much superior to the link engines that the engineers much preferred them, and even now speak regretfully that they are not still in use. These facts cannot be successfully ignored even by the audacious assurance of the writers in *The Engineer*. Because a device was a failure in England, it does not necessarily follow that it is not a success here.

In referring to automatic cut-off stationary engines, I have not confounded those of slow with those of quick speeds, as the writer charges. I referred to the Porter-Allan and Buckeye, two of the best known as well as the best working engines in the world. In the Porter-Allan, which runs as many turns as the locomotive, it is found necessary to use separate valves for exhausting. If the statement of *The Engineer* that the link is the best high speed cut-off were true, why did not the inventors of this engine fit it with the link, and control its shifting by means of the governor? They would certainly not use more than one valve if one would suffice. A free exhaust can be had without a necessarily early exhaust. What is said about compressing up to 100 lbs. per square inch, to keep the crank-pin from running away from the piston is very true. But in the link engine, owing to the necessary excessive compression; that is, its commencing so early, there must, of necessity, be more clearance to prevent the compression pressure from exceeding that in the chest. In the V-hook engine the clearance may be reduced to a much less percentage, and compression commence much later, and extend as high as may be desirable. The later commencement of the compression will result in a larger area in the card.

Any well-built American locomotive, if placed on English roads, and set to pulling the ridiculously light trains run in that country, would make high speeds as easily as English engines do. *The Engineer* obviously assumes that the high speed problem is solved in England. The solution of it on this side of the Atlantic, however, is not the making of 50 miles an hour with a few English baby-carriages, but the making of that speed per hour with a train of American coaches, which, inasmuch as such trains weigh about twice as much as the average English trains, puts quite another face on the matter. Our English friend makes the suggestion that if a deputation of railway men from the United States would visit England they could learn all about the high speed problem in a couple of weeks; but I am inclined to think that if a similar deputation were to come here from England they would discover among other things that an English locomotive, loaded with an American load, would prove inferior to an American locomotive, as has been shown time and again in different countries where the trial has been made, and in spite of the fact that the stiff, ugly and unwieldly English engines were nursed and petted by their managers and backers. It is a knowledge of this superiority of the American locomotive which puckers *The Engineer's* mouth

with sour grapes whenever the fact is mentioned.

My proposition is this: Inasmuch as high speed with American loads will necessitate more boiler power, it is requisite to procure a gear that will make the most economical use of the steam in order to keep the dimensions of the boiler within bounds. If one gear will show 25 per cent. more work than another, that is the best one; and as the independent cut-off will do this in the average number of cases, it is therefore the better gear, forit can be arranged to compress as high as may be necessary, and give a freer, exhaust than the link, without exhausting so early. The V-hook engine, by giving a large exhaust area, will offset the cramped early exhaust of the link. Although the link has "done for 30 years" in England with their light loads, it will not do here if higher speeds with present loads are to be made, and the "American readers" of *The Engineer* may rest assured that it never will do under the new condition of things.

American engine builders very wisely decline to copy ideas from English engines inasmuch as engines are here loaded with reasonably heavy loads. The copying of English engines to do American work would be a step backward, because they have proved inferior, and it hardly seems advisable to copy them, under the circumstances, unless our own railway companies have grown so rich that they can afford to keep such expensive playthings to tear the track as well as themselves to pieces with their rigid wheel base, while it would be necessary to load them with half our ordinary loads to keep them from getting in the way of our own better type of engines. The English have built engines to run at high speeds, and then they load them so lightly as to allow the high speeds to be made. American engines will do the same thing with the same light loads. But here the load is established, and the search is for a type of engine that will haul these loads at greater speed, a search that will only be rendered more difficult if English ideas are copied or the link motion adhered to. If the link is the best high speed valve gear, will *The Engineer* explain why it is that high speed with American loads has never been attained either here or in England? I do not mean to assert that high speed here with present loads can be accomplished if the present size of boiler is to be used with the V hook cut-off, but it is possible to more nearly accomplish it by increasing the boiler power and using the independent cut-off, than by any other means.

FRANK C. SMITH, M. E.

DELAWARE, O., March, 1881.

Locomotive Smoke-Boxes and Fuel Economy.

To the Editor of the National Car-Builder:

I observe in your March number a brief notice of a competitive trial between the engine "Altair," of the New York, New Haven & Hartford railroad, fitted with Buchanan's water table, and another engine of the same road (name not given) similar, except in having an ordinary fire-box. The "Altair" is credited with a "very economical fuel record," her figure being $28\frac{8}{100}$ pounds of coal per mile, as against over 45 pounds for the plain engines.

In the absence of full data, and assuming other things to have been equal, a record of nearly $33\frac{1}{3}$ per cent. in favor of the Buchanan water table, as above, is extremely creditable; and it is remarkable, in view of the obvious advantages of this improvement, and the correct principle of combustion on which it is based, that it has not been made the subject of such thorough practical test by some of the leading trunk lines as would definitely establish the extent of its practical value in the economization of fuel.

A question of considerable importance to several railroad companies not a thousand miles from New York could be settled by a fuel test of the "Altair," as handicapped by her extended smoke-box (five feet from flue head to front), with a similar engine having a smoke-box of the ordinary length of thirty inches, each engine being provided with the Buchanan water table. The pumping out of the excess (fifty per cent. or more) of volume of gases, from a long smoke-box such as is placed upon the "Attair," is an expensive operation, and is by no means compensated for by the supposititous virtues of the extended smoke-box as a "spark arrester." As to its merits in the latter regard, I have yet to meet a traveler who will rise up and call its originator "blessed." There is probably no machine that will do duty under difficulties as well as a locomotive; and as coal is cheap, and unprejudiced experimental research scarce, and therefore, presumably, expensive, it is not unlikely that smoke-boxes will, for a time, continue to be lengthened instead of reduced. Meanwhile, however, the result of erroneous construction is necessarily felt in some manner, and its effect, in this case, is to diminish the usefulness of genuine improvements made in the proper direction, to wit, at the fire-box end.

I append the following record of a plain fire-box engine 17"×24" cylinder, with a smoke box of the ordinary size, made within two years past, as my ground for the opinion that the "Altair," with the excess of smoke box removed, and the Buchanan water table retained, would beat $28\frac{8}{100}$ pounds.

Miles run, 1800; average cars in train, 7; average consumption of coal per mile, $31\frac{8}{100}$ pounds.

Miles run, 1800; average cars in train, $6\frac{1}{4}$; average consumption of coal per mile, $28\frac{8}{100}$ pounds.

Miles run, 1788, average cars in train, $7\frac{3}{4}$; average consumption of coal per mile, $33\frac{8}{100}$ pounds.

Average speed, 34.5 miles per hour. J. S. B.

The Tallman Freight Train Brake.

To the Editor of the National Car-Builder:

As railroad men generally are becoming more and more interested in the subject of a train brake for freight cars, any facts in regard to the progress that is being made in the solution of this most difficult problem will doubtless be acceptable to your readers.

Several months ago a number of cars were fitted up with automatic brakes for the purpose of testing how far they were capable of meeting the requirements set forth by the committee of the Car-Builder's Association in its last report. The result of these tests has been to develop one improvement after another in the right direction, and indicate that the difficulties which at first appeared to be so formidable are in a fair way of being overcome.

Four of the cars referred to were equipped with what is know as the Tallman brake, and which has been operated with varying success from the time it was put on until now. A brief description of this device will doubtless be of interest to those of your readers who have not had an opportunity of seeing it. On the outside axle of each truck is a friction wheel. There is also another friction wheel on the loose end of a swinging shaft, to which is attached a lever operated by the draw-bar of the car. To the stationery end of the shaft is attached a small gear-wheel, which meshes with a large one attached to a second shaft. To this second shaft is attached the brake chain and a relief spring. The construction is such that one of these wheels is stationary on the shaft while the car is moving in one direction, and rotates when it is moving in the opposite direction. The brake being set for the direction the train is to run (or thrown in gear at the front end of the car) its application is automatic whenever there is sufficient resistance applied to the front end of the train by the engineer or brakeman to slightly compress the draw-spring, the friction wheels being thereby brought in contact, and the brake applied in proportion to the resistance *to a given amount*, being graduated by a spring interposed between the lever and draw-bar. At first sight this would seem to prevent the backing of the train, but such is not the case; for in backing, the car wheels take the opposite direction, leaving the brakes in their normal position.

On the 15th of March a trial of this brake was made with very satisfactory results. The train consisted of an engine with air-brake, four cars with the Tallman brake, five cars loaded with fifty tons of coal, and one coach. Several stops were made while running at various speeds from 15 to 25 miles per hour. No hand-brakes were used; yet the stops were made with such slight shocks, with one exception, as to be scarcely felt in the coach, notwithstanding all the load was in the rear and the braking in front of the train, a result which seems to disprove the theory that a train can not be successfully handled unless the brakes are first applied at the rear end. The trial was witnessed by a number of railroad men and others who agreed in the opinion that the brake made good stops. Further improvements will probably be made in this device before the association meets in June.

C. E. GAREY.

Car Painting—Dark and Light Colors.

To the Editor of the National Car Builder:

Your correspondent "Occasional" gives us in your last issue some very good ideas on the subject of car painting, but I am compelled to differ with him upon some points. He says that the Master Car Painters' Association have done little thus far but talk about the different colors, and that the railway officials have in the meantime stepped in and adopted dark colors for passenger cars. This, I think, is calculated to convey a wrong impression. Master car painters, whether in the association or out of it, have no power of determining what colors shall be used in the painting of cars. They can only discuss the matter, and make recommendations so far as they can agree among themselves. The final decision rests with the road managers, and to this the painters must conform, no matter what their individual opinions may be as to dark or light colors.

It is, however, none the less incumbent upon car painters to look well into the elements of cost and durability, and the comparative economy of different colors and methods; and this is just what they are doing at their annual meetings and in articles contributed to railway publications. It is hardly to be expected that a unanimous decision upon every point will be reached at once. But in reference to the economy of light and dark colors for the outside cars, it is well known that some of the members of the association have for years been engaged in testing the wearing qualities of the different colors, and that it is not yet quite clear to them, as your correspondent asserts, that as good work can be done in dark colors as in light ones. I submit, therefore, that the fact that some roads are adopting dark colors is no sufficient reason for discarding light colors, especially when it is well known that road officials who know little or nothing about painting often decide how cars shall be finished, as a matter of taste purely, and without any reference to economy in the wear and durability of the finish.

I heartily agree with what your correspondent says about the ready-made patent primers that have been put upon the market of late. They are, however, [used very little, master painters, as a rule, preferring to mix their own primers, so they can know what kind of ingredients they are made of. A body coating so transparent as to show the kind of wood the panels are made of, will not stand exposure, nor hold out the varnish, nor give

proper protection to the painted surface. The finish of a car must be protected both at the surface and foundation, by good material in the one case, and good varnish in the other. A solid body is an essential basis for good painting, and the want of it is where some painters fail, and why their cars have to be revarnished every six or eight months. There is not oil enough in the foundation coats. Too much japan color is also used in many shops in order to hasten the work. This soon becomes lifeless, and the varnish sinks in instead of doing service till it wears out.

Your correspondent says, and I agree with him, that lead is unquestionably the best pigment known for painting under a varnished surface, and that there can be no objection to it in filling-up coats. Then why, I would ask, is it not equally as good for a finishing color as the dark colors that are used? Again, he says, that he is assured by many car painters that the labor and material, up to the color coats, are equal on light and on dark cars. This I cannot admit, because it must be evident to any one who has used both colors, that the labor is one-fifth less on the light cars, for the reason that a light colored ground shows an uneven surface and other defects less than a dark ground does; and besides, there is more labor all the way through in painting a car with dark colors. Instead of using five coats of light color, as "Occasional" says, we get a solid job with three coats, costing 12 cents a pound instead of 18, as he puts it, while we give the same number of dark coats costing 30 cents a pound; but, of course, the dark color being lighter, in bulk, a less number of pounds are required. I do not claim, however, any saving in the cost of material, but I do claim a saving in the additional wear we get from a light colored car doing good service 18 months without revarnishing, while a dark car needs revarnishing in 12 months.

There is no question in my mind about dark surfaces absorbing heat, and light ones reflecting it. This is manifest to everybody's experience. The scorching heat of the sun's rays in summer is the worst enemy to the durability of paint upon cars; and those who have had long experience in the use of all shades of color, from white to dark brown, ought to know something upon this point, as it affects the wear and durability of paint; and I may cite as an evidence of the admitted superiority of light colors in this respect, a vote taken at the last meeting of the Car Painters' Association, which resulted two to one in favor of light colors for cars, as being the most durable and the least expensive to maintain. BUCKEYE.

To the Editor of the National Car-Builder:

I notice a communication in your March number on the comparative economy of light and dark colors for the outside painting of cars. I know from my own experience as a car painter that there is a great difference in the durability of colors. How many railroad superintendents and managers, I would ask, require the wearing qualities of a color to be tested by their foremen painters before deciding upon its adoption? Not many, I venture to say. Dark colors, it must be admitted, make a fine and brilliant appearance, and this may account for the changes that have been made by some roads from light to dark colored cars. I have used dark colors on the cars of the road with which I am connected for the past nine years, and with great success. The high officials all like it, but every painter of experience knows that it costs much less to paint a car in readiness for decoration when light colors are used. Imperfections in the wood-work show more plainly with dark colors, and consequently more care is required in leveling the surface. A dark surface also absorbs the heat of the sun much more than a light surface, causing the oil to bleach out from the varnish and color, and hasten decay. Some think that any color protected by varnish will wear equally well, and that color has nothing to do with the wearing of the varnish. But every practical painter knows that this is an error. The life of a car that has been well painted with any of the dark colors does not exceed six years upon an average, and the car must be varnished once a year to keep it in fair condition. But so far as relates to durability and economy, aside from any other considerations, I prefer light colors for the outside of passenger cars. The dark shades, it is true, make a good ground upon which to show gold leaf. It is also urged that they do not show dirt. Admitting this, I claim that there is nothing more destructive to paint than dirt, cinders and ashes, and dark cars are often allowed to run too long without repainting because the dirt does not show.

Your correspondent says that lead is the best pigment known for painting under varnish. If it is the best for one coat, why not for all coats? The choice of a color by managers is too often a matter of fancy, a fact that is well know to most foreman car painters, and even to many casual observers.

JOHN RATTENBURY,
Master Car Painter C., R. I. & P. R. R.

The Over-Working of Railway Employes.

To the Editor of the National Car-Builder:

In what I shall say upon this subject I shall endeavor to be practical and avoid all exaggeration. There are some things that do not need to be proved, because they are self-evident; and among these are the limits prescribed by nature to man's physical and mental endurance. Whenever the vital forces are taxed beyond these limits, the penalty is as certain as that effect follows cause. Previous to the advent of railroads there were few occupations that required such a prolonged and continuous strain as that to which a large class of railroad employés are now subjected. In military service the physical capacity of the soldier is not overtaxed when on guard duty, the time being limited to six hours. The laws of nature are recognized in this and in other cases where arduous and highly responsible duties have to be performed. But how is it in railroad service? Are the hours of work restricted within the limits of safety, or are they dangerously extended beyond such limits? Instead of answering these queries directly, I will cite an instance or two among the thousands of similar ones that daily occur.

A freight conductor came into a terminal station at 2 o'clock p. m. on Saturday. His time from the previous Sunday morning, counted by the trip, was eleven days. Too sleepy to eat, he goes directly to his room, throws himself on the bed with his clothes on, and is instantly asleep. Two hours later, the train-dispatcher wanted a conductor to take out a train at five o'clock. There being no one to take it but the man who had just gone to sleep, a messenger is sent for him, and, after going a second time, succeeds in waking him sufficiently to make him understand what is wanted. After being virtually dragged to the office, more asleep than awake, he remonstrated, saying he was not fit to go, and could not be responsible for the train. He was told, however, there was no alternative, that the train was a special and must go, that he was the only man there was to take it, and that he would be furnished with two good and trusty brakemen. So he goes; finds the train a mixed one with a coach full of passengers to be left at a certain station. On arriving there, the side track being empty, they pull through, cutting off coach in front of station. The trusty brakeman is told to let the train out and close the switch. The conductor stops to attend to his passengers, and then starts up the track. The night is foggy and dark, he motions the train to go ahead and jumps on the caboose. The switch is found open when the next down-train arrives, and engine and one coach are slightly damaged. The conductor is discharged, and posted for leaving switch open.

Another instance is that of a locomotive engineer, who was forced upon duty under very similar circumstances, after running 48 hours. He was told by the engine dispatcher that it was a through train, with only meeting-points to make, and that he need not be out more than eight or nine hours. He starts out; the night is dark, the cab warm, and the struggle begins between outraged nature and the effort to keep awake. In an interval of unconsciousness, after vainly endeavoring to distinguish land-marks in the darkness and get his location, he passes the switch he should have entered, calls for brakes and tries to stop, but strikes and slightly damages the engine of the train he was to pass, and also his own engine. Penalty, indefinite suspension.

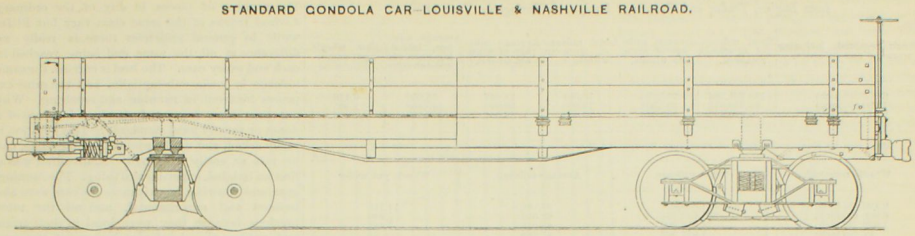
These are mere common-place examples of what is occurring every day. None but those who are familiar with train service can realize the demoralizing effects of over-work upon railroad employés. Well-meaning, faithful men, of correct habits, when subjected to this excessive strain, are apt to become discouraged, indifferent, and even reckless in many cases. During this present winter we know of an engineer who was kept on his engine 62 hours, except when it was being coaled or turned, and getting but one warm meal in 24 hours. From 24 to 36 hours on duty has been a common thing with locomotive engineers during the past year. This kind of service, exposure to night air and all the vicissitudes of weather and temperature, and without regular meals, brings the system into a condition in which strong stimulants produce a very grateful and exhilarating effect, and the result is confirmed intemperance in a large number of cases, and of course disqualification for further railway service.

The national government has made eight hours a legal day's work, while in some of the states it has been fixed at ten hours. Upon general principles and for special reasons, I would not favor legislative interference with the details of railroad business, but after long practical experience as a railroad mechanic, I am forced to the conclusion that a law fixing the maximum time, or consecutive number of hours that an engineer should remain on an engine, and a conductor on a train, would be advantageous to all concerned.

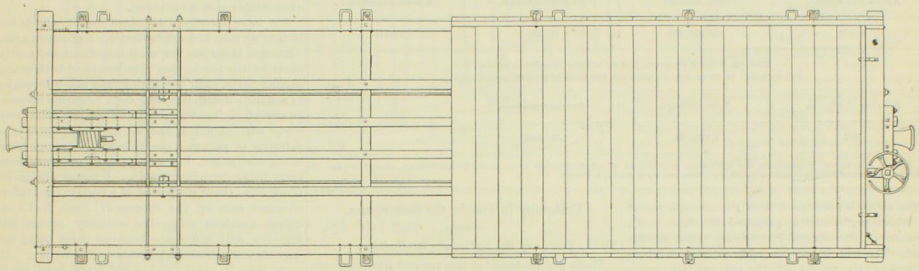
A RAILROAD MAN.

MR. C. E. GAREY, M. C. B. of the New York & Harlem road, makes a very neat and comfortable car seat which has some notable peculiarities. By first covering and stuffing the top of the seat rail with hair he secures a full and firm edge that remains a good square edged rim as long as the seat lasts. A more flat and elastic seat is also obtained by dropping the bottom board on which the springs rest below the seat frame. This yielding center and firm edge adapts the seat more to the form of the sitter. Instead of a seat-back band of metal, a stuffed roll of plush about 1¼in. deep is put on tapering at the ends to meet the seat-back arms, and put on so as to show neither nails, screws nor stitching. This makes the back somewhat wider, and is a much pleasanter finish both to touch and look at than the metallic band. Mr. Hoit, at West Albany, makes the same style of seat, except the roll, by carrying the plush front over the edge about an inch on to the back, and covers the edges of the green and scarlet plush with a half-inch band of figured lace.

STANDARD GONDOLA CAR—LOUISVILLE & NASHVILLE RAILROAD.



Side Elevation and Section.



Floor Frame and Floor.

GENERAL DIMENSIONS.

Length, outside of end sills	30 ft.	0 in.
Length, inside of end doors	28	3½
Width inside of side boards	8	1½
Height of sides and ends	2	3
Out of end sill to center of bolster	4	6
Between center sills	—	10
Between center and intermediate sills	—	12
Between intermediates and side sills	1	9¼
Center to center of bolsters	21	0
Between centers of center ties	6	2

BODY TIMBERS.

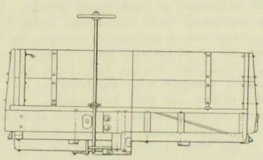
Side sills	5 x13 in.	x 30 ft.	6 in.	Wh. oak or Yel. pine.
Intermediate sills	4½ x 9½	x 29	9 in.	Wh. oak or Yel. pine.
Bolsters	4½x12½	x 8	6	Wh. oak.
Center sills	4½x 9½	x 29	0	"
End sills	6½x 9½	x 10	0	"
Center ties	4½x 8½	x 9	0	"
Draft timbers	4½x 8½	x 5	0	"
Dead-woods	4½x 9½	x 2	6	"
Side planks	12½x 2½	x 30	6	Yel. pine.
Stakes	4 x 4	x 3	0	Wh. oak.
End planks	13½x 2½	x 8	6	Yel. pine.
End stops	2½x 8½	x 2	6	"
Truss-rod blocks	4½x 4½			Wh. oak.
Flooring	1⅜ in.	202½ sup. ft. net		"

MATERIALS FOR CAR BODY.

Lumber	2,135 ft. b. m.
Bolts, nuts and washers	2443½ lbs.
Assorted wrought iron	801 "
Castings	933 "
Weight of car, 18,500 lbs.; capacity, 36,000 lbs.	

A New System of Freight Train Brakes.

A trial was recently made on the St. Louis & San Francisco Railway of a system of freight train brakes devised by the American Brake Company, of St. Louis, Mo. Of the precise nature of the system and the manner in which the braking power is applied, we are not advised; but its performance seems to have been very satisfactory, so much so as to have won the approval of a large number of



End Elevation and Section.

prominent railway officers who witnessed the trial. The portion of the road on which it was made was between Springfield and Rolla, a distance of 125 miles, abounding in heavy grades and sharp curves. The train consisted of an engine and tender equipped with the steam driver and tender brake of the above named company, 16 freight cars equipped with their automatic freight train brake, and one caboose and one passenger car not so equipped, the entire weight of the train being 491 tons. The weather was unfavorable, and the track was in many places covered with snow. The train, however, was at all times under the complete control of the engineer. In several instances, while going down grades as high as 65 feet to the mile and at a speed of 25 miles an hour, the train was stopped in 62 seconds and in 410 yards. The brake was automatically freed and the train ready to be backed as soon as the stops were made. No other brakes were used except the automatic, which is not continuous, but acts independently upon each car. Another important point noticed was that in passing over depressions in the track the brake operated to ease the motion of the train, and give it a steadiness quite unknown under the operation of hand brakes. It is also said by the railway officials who witnessed the trial, that the slipping of wheels is likely to be entirely prevented by the automatic application and release of the brakes.

We are informed that in consequence of the satisfactory nature of these experiments, the above named railroad has adopted the system, and will immediately apply it to its entire freight equipment, beginning with its heavy freight engines and stock cars. We hope the proprietors of this brake system will lose no time in furnishing full particulars in regard to its mechanical construction, performance, and cost of application, to the committee on freight train brakes of the Car-Builders' Association, of which Mr. C. E. Garey, of Morrisania, N. Y., is chairman.

A LOT of twenty new passenger cars is to be added to the equipment of the New York Central & Hudson River road, some of which have already been completed. They have the appearance of being higher and wider than usual, which is owing to the clear-story having an extra width of twelve inches. This, with the extra large windows, gives a better diffusion of light. There are five Hitchcock registers, with globe ventilators, and six deck windows that can be opened for ventilation, besides the end ventilators. The inside finish is in solid mahogany. The truss-planks being on the outside of the side-framing, the lower wainscoat rail begins at the floor. The window panels extend up to the cornice. In some of the cars there is a single pilaster in the center of the panel, and in others one on each side of the panel and running to the cornice. The upholstery of the seats is in the usual style, but without metal bands on the top of the seat backs.

Abstract of the Lake Shore & Michigan Southern Railway Report of Mileage made by Wheels removed from Engine, Tender and Passenger Equipment, during the Year 1880.

Wheels removed, including worn-out and defective.	Total mileage of all wheels removed.	Greatest mileage of worn-out wheels.	Least mileage of worn-out wheels.	Average mileage of worn-out wheels.	Average mileage, including worn-out and defective	New wheels put under.
2,009 (33 inch)	132,761,384	203,205	19,064	73,647	63,250	3,178
1,290 (30 inch)	63,840,813	204,501	10,896	58,007	49,480	1,085
411 (28 inch)	20,376,327	193,610	15,488	58,007	49,577	437

Miles run by Engine, Tender and Passenger Equipment Wheels removed during five years, 1876-7-8-9-80.

Wheels removed.	Total mileage.	Average mileage.	Wheels put under.
9,126 (33 inch)	521,058,827	57,096	14,115
6,860 (30 inch)	291,645,352	42,514	7,448
1,632 (28 inch)	74,376,932	45,574	7,448
42 (26 inch)	1,977,592	47,085	44

Recapitulation of 33-inch Wheels worn out in five years.

Number of wheels.	Total mileage.	Average mileage.	Wheels put under.
6,969	439,982,404	63,134	14,115

33-inch Wheels reported flat by sliding, during 5 years.
Not included in foregoing because not the fault of iron or manufacture.

Number of wheels.	Total mileage.	Average mileage.
262	7,160,941	27,332

NOTE.—This report represents the minimum mileage, as no allowance has been made for switching, except in case of shifting engines, which are estimated at six miles per hour when in steam.

The above is condensed from the annual report of wheel performance prepared by Mr. A. C. Armstrong, the General Purchasing Agent of the road. The wheels used are of five different kinds or makes, the names of the makers not being given. The form of the yearly reports being uniform it is easy to compare one year with another as follows:

	1879.	1880.
Worn out wheels removed	2,243	2,751
Broken tread	330	173
Flat (sad chill or crumbling tread)	622	673
Sharp flange	190	201
Broken plate	6	2
Total number of wheels removed	3,391	3,800
New wheels put under	4,688	4,700
Average mileage 33-in. wheels	56,055	63,250
Average mileage 33-in. wheels:		
From 1876 to 1880 inclusive		63,134
From 1875 to 1879 inclusive		59,130

From this it appears that there were 409 more wheels removed from all causes in 1880 than in 1879. The average mileage has also been increased 7,195 miles during 1880, and during the five years ending with 1880 the average mileage shows an increase of 4,004 miles over that of the five years ending with 1879.

The Lake Shore road has, we believe, a record of wheel performance that shows the mileage of each wheel in the engine, tender and passenger equipment, the date when put under and when removed, and the cause of removal. No wheels are transferred from passenger to freight service. The object of this record, and the wearing out of wheels in passenger service, is to ascertain, on the basis of actual mileage, the merits of the wheels made by different manufacturers, and also whether each wheel makes its guaranteed mileage. A 33-inch wheel is considered "worn out" when it has run 50,000 miles, or when the chill is worn through in more than two places, although it may have run very much less than that distance. There are, of course, many exceptional wheels that make a much greater mileage than this before they are actually unfit for service, while many fail to make their guaranteed mileage, and many of these are removed for defects that are not the fault of the metal or the making.

THE Illinois Central road has built 100 twenty-ton coal cars. They all have Thielsen trucks.

Uniformity in Freight Car Construction.

To the Editor of the National Car-Builder.

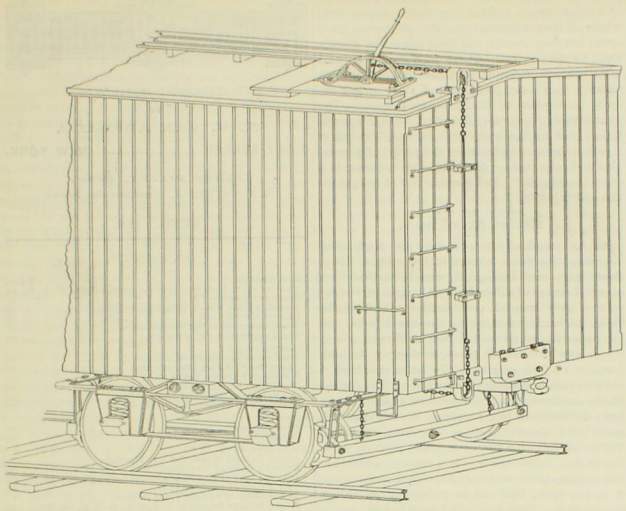
There are probably at this present time upwards of 500,000 freight cars in actual service upon the railroads of this country, and representing a capital of more than $200,000,000. These cars move every where without regard to local ownership, so far as the uniformity of track gauge permits. The rules regulating their interchange make them to a certain extent partnership property, for the proper care of which each road becomes responsible. What this implies, only those who are practically familiar with the handling and repairing of cars can fully comprehend. As an index of the extent of such repairing and handling, it has been stated upon reliable authority that at the West Albany shops of the New York Central and Hudson River road, 40,347 repairs were made in 1879 to freight cars belonging to other roads, these figures indicating the number of repairs, and not the number of cars repaired, some of the cars being repaired more than once. Of the delays and losses arising from diversity of construction it is needless to speak, as every railroad man, and especially those in charge of repair shops, know all about it. This state of things, which is every day becoming more aggravating, annoying and expensive, seems to warrant the assertion that freight cars, in the matter of their construction, and in view of their importance as the bread-winners of the roads, do not receive anything like the attention they deserve.

In regard to a greater uniformity in their construction, there really does not seem to be any insuperable difficulty in the way of its accomplishment. A glance at the drawings and specifications of box, stock, and gondola cars published in the CAR-BUILDER, and representing local standards of various roads, shows that an approximate uniformity in body construction in respect to general dimensions, size of timbers, etc., exists already, so much so, at least, that repairs of car bodies can usually be made without much trouble or delay. The difficulty is with the drawing attachments and running gear, and is caused exclusively by an absurd diversity in details—diversity for the sake of diversity—as unnecessary as it is senseless. The number of pieces in any of the ordinary 4-wheel trucks of the same class vary but little, while in general principles there is really no difference at all, the same end being reached in each and every case. The load is carried, the same mileage is made substantially, and the same expenses incurred in running and repairing. Why not then have a general standard in place of a dozen or twenty local standards? This question is easily asked, and unlike some other questions, can be just as easily answered. Railroading was at first an isolated, experimental thing. The running-gear and drawing contrivances for cars were also isolated and experimental, and all the more precious because they were local in their origin and unlike other local contrivances of the same sort that were just as good and not a whit better. The supreme folly is in striving to keep up this isolation in the face of a system of interchange as unavoidable as it is universal.

We have already a standard size of wheels for freight service, and approximately a standard axle. Although these are the most important and costly parts of the truck, they give less trouble than the smaller parts, each of which might also be brought to a standard with but little cost. Journal brasses, as everybody knows, give more trouble than any other part of a car, and all in consequence of a diversity of patterns, the difference in many cases being very slight, but sufficient to prevent them from being interchangeable. I might cite as an illustration three roads that at a certain time interchanged cars by the thousand. Each had a so-called standard brass—the ordinary square flat top—the only difference between them being the way they were held in position by the wedge. All were equally good, and could have been made exactly alike with no more cost than ten minutes work of a pattern maker, yet the difference was only just enough to prevent an interchange, and it is still kept up. And so it is with draw-heads. There are hundreds of patterns of the cast iron variety, each serving the same purpose, costing about the same, and having nearly the same weight, yet thousands of cars are constantly waiting upon side tracks for draw-heads to be forwarded by their owners. The same may be said of oil boxes, center-plates, and other castings, that are substantially the same in their general dimensions, and differ, not in any matter of utility, but in the fancy of the designer merely. I might name a hundred advantages that would result from an interchangeable uniformity, such as the doing away with specifications in ordering new cars, the settlement for cars destroyed, etc. But what's the use? The existing diversity is not kept up because the advantages of uniformity are not fully understood and appreciated. It seems to be because the parties interested think they are making money enough as things are now, without being bothered with reforms, or else they do not know how to organize a movement to bring about such reforms—a little of each, perhaps, and a good deal of both.

Years ago it was thought that the mechanical diversities in car construction, originating in the early development of railroads and territorial isolation, would be readily overcome by the formation of the Master Mechanics' and Master Car-Builders' Associations, for mutual acquaintance and intercourse, and with annual meetings for consultation and discussion. These associations have both been in existence a dozen years or more, but the obstacles in the way of the reform indicated seem about as formidable as ever, while the necessity of reform increases with the yearly growth of traffic, and is more urgent and needful now than ever before. Although the prospect is somewhat discouraging, I know of no better way than to keep harping upon the subject of

UNIFORMITY.



HAND LEVER BRAKE FOR FREIGHT CARS.

THE cuts illustrate a new method of applying brakes to freight cars, and which is designed to take the place of the ordinary brake wheels. The nature of the device is so clearly shown in the engravings as to require no explanation. The advantages claimed for it over the brake wheel are greater safety to the operator and greater quickness in its application, the pressure being applied to the car wheels as soon as the brake lever is raised. Its superior efficiency has recently been shown in a case where a train broke in two, and a collision was prevented by the readiness with which three of these brakes were applied, and without which a collision would have been inevitable. By this method the operator knows whether the brake is set without looking over the end of the car, and is in no danger of being thrown from the car, as is sometimes the case when the ordinary brake wheels give way from excessive strain. This method has already been applied to quite a large number of freight cars of the Boston & Albany road, and we are informed that all the box and stock cars of the road are to be equipped with it. The proprietors of the invention are Weston & Chaffee, Springfield, Mass., who may be addressed for further particulars.

Car-Builders' Monthly Meeting.

In accordance with previous notice, the subjects upon which the committees were to report at the annual meeting of the association, were taken up in their order and briefly discussed.

Mr. C. E. Garey, chairman of the committee on freight train brakes, said that trials had been made on the New York & Harlem road of two brakes designed to operate independently on each car. One was the Tallman brake, which made some very good stops. In stopping and backing up it was quite satisfactory, but some considerable modifications were yet needed in it. The other brake (name not stated) had been reinvented half a dozen times within a year, and if the money and patience of the inventor held out, the brake might yet amount to something. The committee had sent out a good many circulars asking information, to which answers were expected.

A letter from Mr. Wm. Loughridge, of Baltimore, was read, stating that his freight brake was making good progress, and would soon be tried on the B. & O. road.

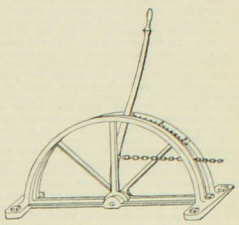
Mr. C. E. Garey spoke of brake-shoes, and said that in the experiments he had made he had found malleable iron to be fully equal to wrought iron, and that both were a great deal better than anything else.

Mr. Snow, of the Ramapo Wheel Works, favored a combination of wrought and cast iron. With brake-shoes of this kind, the Ramapo wheels had made an increased mileage of from 10,000 to 15,000 miles.

Mr. L. Garey submitted the following question in reference to settlements for car repairs: Suppose certain railroad companies get their cars of certain car manufacturers, and that such cars, while in service on through lines doing a through business, should be found defective in some particular part of their construction, so as to require expensive repairs. Under the existing code of rules, the lines on which the cars fail are forced to make the repairs, but in common justice they should be remunerated for such expenditure. The question is, whether the owners of the cars, the manufacturers, or the roads on which they break down, should pay the cost of repairing in such cases.

In the brief discussion which followed, it seemed to be conceded that, so far as the equity of the case is concerned, the owners of the cars would be responsible if the cars were built according to specifications furnished by them to the builders, and that the builders would be responsible if the cars were defective from not being built according to specification. The lines handling the cars could not be held for bad usage in such cases, because the question relates only to defective construction.

Mr. Blackall, of the Delaware & Hudson Canal Co., then raised the question as to how railroad companies were to know whether they were parties to the rules or not. Some would claim to be parties to them one year, and the next year say they were not. The question was also raised whether a company signing the rules was wholly released from being bound by them by subsequent alteration or amendment in any particular. From what was said by those present, the impression seemed to be that the companies in such case would morally be bound by the rules as amended



or revised, unless they gave due notification to the contrary. The rules as they now stand were about as good as they could be, and if they were annulled or abrogated it would be next to impossible to do through business on the roads. It was suggested by Mr. Garey that where roads had rules of their own, and differing from those of other roads, that each road should be bound by the rules of the other in making settlements, or, in other words, on the mutual give-and-take principle.

Mr. Blackall suggested that a printed list of all the roads that are parties to the rules be sent to superintendents and managers. He had made many settlements of late with roads which claimed they were not parties to the rules, and would not settle in accordance with them, but the same roads would settle with Mr. Garey according to the rules.

Mr. Smith—They settle according to the rules when it is to their advantage, but if not to their advantage they prefer to settle on some other basis.

Mr. Blackall—That is it.

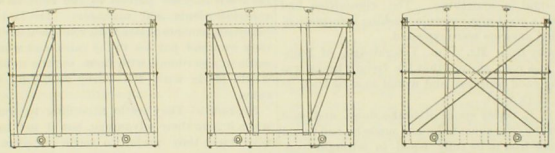
Link Motion and Separate Cut-off Valves.

The Engineer (London) makes some rather pointed editorial comments upon the communication of Mr. Frank C. Smith in the February number of the CAR-BUILDER, in which he argued that the link-motion in locomotives is incompatible with the attainment of high speeds. We print elsewhere the reply of Mr. Smith to the strictures of our English contemporary, and in order that the points at issue may be more fully understood, we give below the essential portion of *The Engineer's* article. The writer says:

"The old-fashioned gab motion, or V-hook, as it is called in the United States, with a separate cut-off valve to give expansion, is as old as the days of Stephenson. They could never be made to answer, and they never will. To use them effectively, there must be either three eccentrics to each cylinder, or a complex mass of levers and pins and slots, the existence of which on a high speed locomotive would be simply intolerable. Separate cut-off valves have been tried in no place more than the United States. To assume that the link motion will not do, in the face of the fact that it has done for some thirty years in this country, and that it is now fitted to hundreds, we had almost said thousands, of English engines, any one of which can run with ease sixty miles an hour, is just a little absurd to Englishmen. In truth, the link motion is the most perfect thing that can be applied to a high speed locomotive, just because of the peculiarities which Mr. Smith holds to be its grave defects. The English locomotive is beyond question the most economical non-condensing engine in existence, the average consumption of fuel in an inside cylinder engine not exceeding 3 lbs. of coal per indicated horse-power per hour, while in some cases it is much less. Thus, in the "Great Britain" broad-gauge engine, 18×24 cylinders, and single 8-feet driving wheels, it was found when the reversing lever was in the fifth notch, the steam being

expanded three times, that the consumption of feed-water was at the rate of 21.24 lbs. per indicated horse-power per hour. Assuming that each pound of coal evaporated 10 lbs. of water, this gives a consumption of 2.12 lbs. per horse per hour.

Like a great many other engineers Mr. Smith thinks, no doubt, that a perfect diagram must have a straight vertical admission line, a hyperbolic expansion curve, and square corners; and he furthermore perhaps believes that the strain put by the steam on the piston accurately represents that on the crank pin, and in all this he is wrong. The momentum of the piston, with its rod and connecting rod and cross-head, is great enough at high speeds to alter totally the strains to which the crank pin is subjected; and in any locomotive when running at sixty miles an hour the crank would have to drag the piston away from the cylinder cover at each end of the stroke, unless compression and early admission had previously sent the pressure up to 100 lbs. or so on the square inch. In the same way, when the steam pressure falls after the steam is cut off, the momentum of the moving parts keeps up an impelling force on the crank-pin long after that of the steam has practically ceased. Again, it is well known that if, when a locomotive with a heavy load is running at a high speed—say fifty or fifty five miles an hour—being at the time well linked up, the reversing link be moved forward another notch, so as to give more steam, the effect is at once to reduce the speed of the engine instead of accelerating it. This effect is produced by rendering the exhaust more tardy, and so augmenting the back pressure. It is the special advantage of the link-motion that it exhausts very early in the stroke; and for outside cylinder engines—which have always more back pressure than inside cylinders, because of the greater dampness of the steam in them—this early exhaust is particularly required. At slow speeds, however, the link-motion, when notched up, loses nearly all the advantages of which we speak. Then the exhaust takes place too early, and the compression is excessive and useless, seeing that the moving parts have no momentum to speak of. It is here that Mr. Smith has blundered. He has confounded slow and quick speeds, and assumed that, because the link-motion is, beyond doubt, a defective expansion gear for engines running at 60 to 100 revolutions per minute, it must also be defective at 250 to 300 revolutions per minute. There is, in point of fact, no analogy between the two. As a valve gear for high speed engines the link-motion, especially Allan's type, is as near perfection as may be as a distributor of steam; but for slow speed engines it is unsuitable, save that its great simplicity renders it an admirable reversing gear.



1. 2. 3.

END FRAMING OF BOX FREIGHT CARS.

A CORRESPONDENT sends us the above diagrams representing three different methods of framing the ends of box freight car bodies, requesting us to publish the same for the purpose of eliciting the opinions of practical car-builders as to which one of the three is the best, and the reasons therefor. For convenient reference, we have numbered the diagrams, and shall be glad to print in our next issue any views that may be sent us on the subject, or drawings of what may be considered better methods.

An Easy Thing.

What an easy thing it is to pilot a crowded ferry boat across the East River and into her slip without a bump or a shock. If you don't believe it, try it! Also, what an easy thing it is to drive a locomotive. Pull a lever, and away she goes. Pull another, and she slacks up and stops. That's all, as most people look at it; but it is not all by any means. The quick eye, firm hand, and steady courage, the knowledge of every mile of the road, the sharp lookout for signals, the putting on steam upon up-grades and shutting it off on down-grades, the difference of expansion in the rails between hot and cold, wet and dry, and the ever present feeling of responsibility for peril of life, limb and property—all these are matters unknown to the mass of the people who pay their fare, take their tickets, and get to their journey's end. Their lives, nevertheless, have all the while been in the hands of a rough, grimy looking man in the engine cab, whom, if they meet him on the platform, they avoid lest they should soil their silks and broadcloth by the contact. These men should be, and often are, scientifically educated; but they have no very high social position, and their wages are quite inadequate to their responsibilities. The gentlemanly conductor, however, with his regulation uniform and well displayed watch-guard, is a personage of consideration, the petted of passengers and respected by directors. The engineer is a mere "mechanic!" The world is full of irregularities and injustice.

Standard Screw-Threads.

As for standard threads, says the *Mechanical Engineer*, we never expect to see such a thing. Some men can distinguish objects further than others, because of different focal lengths of vision; others have mental peculiarities which make them mechanically blind to obvious defects, and for these reasons there will be a sufficient minority everywhere, at all times, to destroy the uniformity of the majority. To be a standard it must be alike and adopted everywhere. The United States standard is not standard, because there exists a different one in general use. We might as well speak of a general inch as a general standard. We do not see with our eyes. We perceive with our brains. The eye is only a camera, a mechanical arrangement to arrest an object and present it to the brain that sits in judgment on things presented it. That is a point which will, in our opinion, militate against a standard system of screw-threads all over the country.

But, says some objector, "we have one standard system now in gas and water pipe; if that is maintained, why can't it be in machine bolts?" Our reply to this is that it is true we have an ostensible standard, but is it adhered to? Ten threads are ten threads in all gas pipe, but what kind of ten threads? Any kind that any body chooses to make. Gas-pipe thread is not a mechanical fit; if it goes together three threads it is all right. A pair of tongs, a strong helper, and a little red lead will make the rest of them fit very soon. Every engineer knows that there is great variation in gas-pipe threads; that in an inch it will often overrun half a thread at least, but it doesn't matter much. If a thimble strips, there are plenty more—but how would it be in machine work? The wonder is that with the thousands of lathes all over the country, and with taps made by the ton, we achieve anything like exactness and we think it is a most flattering commentary upon the skill of our mechanics and the accuracy of their machine tools and measurements, that we can do as well as we do.

OF the 258 locomotives on the Eastern Division of the New York Central Railroad, 125 have the Watkeys improved valve seat. It is being put into the others as fast as the old valve seats require renewing. The inventor, Mr. Henry Watkeys, of Syracuse, N. Y., has made some recent improvements in it which give it increased value.

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APRIL, 1881.

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EDITORIAL ANNOUNCEMENTS.

Addresses.—*Business letters should be addressed, and drafts and money orders made payable, to* THE NATIONAL CAR-BUILDER. *Communications for the attention of the Editor should be addressed* EDITOR NATIONAL CAR-BUILDER.

Advertisements.—*Nothing will be inserted in this journal for pay,* EXCEPT IN THE ADVERTISING COLUMNS. *The editorial department will contain our own views and opinions; and the rest of the reading matter, aside from advertisements, will be such as we consider of interest to our readers.*

Contributions.—*Articles relating to railway rolling stock construction and management, and kindred topics, by those who are practically acquainted with these subjects, are especially desired. Also early notice of changes in railroad officers, organizations and names of companies.*

SUBSCRIPTIONS *to the* CAR-BUILDER *will be received, and copies kept for sale, at the following places:*

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METALLIC CARS.

An enthusiastic writer in a Western journal calls attention to the urgent need of fire-proof passenger cars, and expresses surprise that some of our enterprising iron and steel manufacturers have not already furnished the railroads with a model car of this description. He says that cars can be made of steel tubes and plates with the greatest facility, and that they would be stronger, lighter, and safer than the present wooden cars, with many incidental advantages in the way of heating, lighting, etc.

The question of employing steel and iron as material for the construction of freight and passenger car bodies is not a new one. There was quite a stir made about it a few years ago. It was not only discussed very generally in the newspapers and technical journals, but quite a large

number of freight cars were actually built in order to test the different theories as to how these materials should be used for car bodies to the best advantage. These included box, gondola and refrigerator cars, the floor and body framing of which consisted of iron tubing and iron and steel rods, held in position by bands and tie-blocks, the outside being covered with sheet iron, and the inside sheathed with wood. Another form of construction consisted of channel iron I beams for floor frame, and heavy wrought iron bars for the superstructure. The cars were from 30 to 34 feet in length, and weighed from 22,000 to 25,000 pounds. What kind of record these cars have made we are unable to say, but the inference is that it is not a very encouraging one, or it would by this time have been spread before the world. There has doubtless been some progress made as compared with the ruder constructions of an earlier period, but this improvement, so far as we can learn, has not been so much in diminished weight and greater proportionate carrying capacity as in a better constructive use of the material. It must, we think, be admitted that the results thus far are not such as to make metallic freight car bodies popular, and until they shall begin to supersede wood in this class of rolling stock there is not much chance for metallic passenger cars.

It is a common remark, even among railroad men, that iron or steel cars will some time or other come into general use, for the reasons that timber is getting scarce and more expensive, and that iron is already extensively used for truck frames and body bolsters. But the question of iron body construction does not depend upon the way in which trucks are built. The two are essentially unlike, and are subject to different conditions. It does not necessarily follow that because iron makes a good axle or crow-bar, it will also make an equally good flag-staff or axe-handle. Railroad cars, as compared with stationary structures, are subject to peculiar conditions inseparable from the uses they perform. These are rapid movement, a minimum of weight, liability to violent concussion, and the necessity of being easily and readily repaired. With respect to these, wood has the advantage over iron at the start. It is lighter, more compressible, will resist shocks better, and, in case of breakage, repairs can be made with less difficulty. Iron, it is true, will not splinter nor burn; a car made of it may not weigh more than a wooden one of the same size and capacity; it may last longer, resist shocks quite as well if rightly constructed, be worth more as scrap when worn out, and be repaired with less difficulty than is generally supposed. These arguments, however, amount to little so long as they are not sustained by a record of performance.

It would be no very difficult thing, as it strikes us, to make a model passenger car body entirely of iron or steel—frame, panels, roof, flooring, and seat-frames, with no inside wood finish even. It could be beautifully ornamented inside and out with paint and varnish, and made to look very light, cheerful and attractive. It would make a few beautiful "runs," and after a few rose-colored local notices in the papers would be lost sight of and forgotten, and the roads would go on ordering new wooden cars as before, without the least regard to the wonders performed by the model car in the way of somersaults down embankments, with no roasting or scalding of passengers as an accompaniment.

One great obstacle in the way of iron body construction is the fact that it can not be carried on without special shops, machinery, tools and workmen. A new and distinct department would be necessary upon every road using, repairing or building such cars. Machinery and tools for the purpose would have to be perfected by degrees, according to the methods of construction that experience should prove to be best. Wood-working machinery, on the other hand, is already perfect, or nearly so, and car-builders know just what kinds to put into a shop.

Another obstacle is the tendency to make iron construction conform to that of wood, when the difference in the two materials seems to require that the construction should also be essentially different for each. Our freight cars are designed almost exactly upon the same principles as our passenger cars, and with special reference to wood construction. It is manifest, however, that if iron cars are ever to be a success, the material must be used constructively, *as* iron, and without reference to the peculiarities of wood construction. The design for a model iron passenger car that would really be a model for imitation would involve such a wide departure from present practice in order to meet the requirements of the new material that a first attempt could hardly be a success except by a miracle.

Meanwhile, railway passengers must rely mainly upon safety-stoves and safety-lamps in cases of collisions and overturns. An ordinary passenger car, with only a narrow door at each end for exit, allowing only one person to pass out at a time, is a regular trap whenever panic-stricken occupants want to get out in a hurry. The material of the inside finish is also so extremely combustible that only a spark is necessary to set it in a blaze. The ends of the car are almost sure to be fired first, thus cutting off access to the doors. In shops and other buildings means are provided for extinguishing fires when they first break out, but no such means are at hand in the case of cars, unless from pure accident. The need of iron as a material of construction, or of some means by which wood may be rendered less combustible, is very great in respect to cars. But we do not expect any immediate revolution in the construction or warming of cars in order to secure greater safety. The mass of people seem to like things pretty well as they are, and will stick to the stoves, good bad and indifferent, and to the varnished and painted cabinet woods a while longer.

COMMITTEE REPORTS.

By reference to the report of the proceedings of the Car Builders' Association, at its annual meeting last year, it will be seen that there are about a dozen committees that will be called upon at the meeting this year for reports upon as many different subjects, every one of which is of great practical importance as pertaining to the construction and management of car rolling stock. The greater number of these may be more properly called standing committees, as they are continued from year to year upon the same subjects, while others were appointed last year for the first time. Members of the association and others who are familiar with its proceedings, and who may happen to glance at the printed list of these committees, will recognize most of the topics as very old ones, that have already been worn quite threadbare apparently, from repeated reports and discussions. Yet they are all of them as fresh as ever, and at no time in the past have they deserved or invited more vigorous handling. No stronger evidence, in fact, can be afforded of the difficulties with which the association has to contend, than the persistency with which these questions present themselves year after year, with no immediate prospect of their becoming stale. From present indications, not the least danger is to be apprehended that the association will die out and become extinct for the lack of something to do. The danger, in fact, lies in the other direction—that it may perish from excess of work, and the absence of the necessary power to make its work effective.

One of the most important subjects to be reported upon at the coming June meeting is that of train brakes for freight cars. The committee last year was increased in the number of its members, and now comprises some of the most experienced and capable car-builders in the country. It is expected that its forthcoming report will contain some specific and valuable information in regard to the merits of several devices that have been perfected to such an extent within the past year as to meet, approximately, the conditions required. There will, at all events, be such a show of progress as to render what has been regarded by many as an impracticable achievement, an assured success, all of which is fairly due to the activity of inventors in responding to the action of the association. Had no committee been appointed five years ago, or had it broken down from sheer discouragement at the magnitude of the task, a freight train brake controlled by the engineer, and acting upon each car independently, would to-day have been regarded as a visionary project impossible of accomplishment. It is hoped that inventors and others who may have information on this subject that is likely to be serviceable to the committee, will communicate the same to the chairman without delay.

Although this committee stands at the head of the list, there are others in charge of subjects of scarcely inferior importance, and who will be called upon for reports at the annual meeting. A standard draw-bar and draw-spring are to be recommended; also the number, position and dimensions of buffer blocks; the position of brake-shafts; a standard wheel gauge; the best diameter of wheels; the utility of coned wheels; the construction of screws and nuts, etc. In order to make satisfactory reports upon most of these subjects, it is indispensable that the committees should be informed as far as practicable of the opinions of railroad men and the practice upon different roads. The plan of issuing circulars for this purpose is still adhered to as the only available means that can be adopted, although it has not been very successful in the past. Among others, we notice the circular of the joint committee of the Master Mechanics' and Car-Builders' Associations in reference to more correct drawings of the M. C. B. standard journal-bearing, journal-box and pedestal; and also of the car-builders' committee on the position of brake-shafts. Not having received copies of these circulars from the secretary of the association in time for our March number, nor in fact any copies from him at all, we could not of course give our readers the benefit of them as early as we would have liked.

In glancing at the several topics for inquiry and investigation by these committees, it appears that the great end aimed at in all of them is the establishment of standards in order to do away with the ridiculous and senseless diversity which exists in the accessories belonging to cars, when these cars interchange and run all over the country without regard to local ownership—such interchange becoming more extensive and more necessary every day. We say ridiculous and senseless, because nothing can be more so than for one road, owning ten or fifteen thousand freight cars, to place the brake-shafts on one side of the car end, and another road owning a like number of the same kind of cars, placing them on the other or opposite side—the cars at the same time getting mixed together in the course of traffic over both lines.

A CORRESPONDENT writes us that the formation of new car manufacturing companies is reported from various points at the West—at Muskegon and Port Huron, Mich.; at Lima and Columbus, Ohio; Indianapolis, Ind., and Milwaukee, Wis.; also a new wheel foundry at Lafayette, Ind. We have also rumors of similar new enterprises elsewhere, but they are not sufficiently confirmed to justify publication.

IT seems to us that a little more brevity in the length of railroad names would save bottles of ink, a vast deal of time, and any quantity of vexatious guessing at the meaning of obscure initials. The good old "Erie" was a model name. It couldn't be abbreviated, nor nicknamed. It was the leader of the stock list, and people liked it in spite of broad gauge and plundering management, mainly because it was short, crisp, compact and comprehensive. It will not easily be wiped out by its ponderous official successor. The names of some roads now contain no less than fifteen syllables. Excessive brevity is of course not practicable in every case; but no road is in danger of losing its identity even if its legal name does not take in the terminal points and all the intermediate cities, towns and geographical divisions of the country along the line.

The Timms Car Truck.

The peculiar feature of this truck is the independent movement of the wheels. The axles are not continuous like those of ordinary trucks, but each wheel is rigidly attached to a short independent axle having two journal boxes, and held in position by the iron frame of the truck, the weight of load being distributed upon eight journals to each truck instead of four. The wheels have a perfectly flat tread, and consequently have very little lateral motion in running, can be placed closer to gauge, and are less liable to climb the rail. It is claimed that by this arrangement there is a saving of fifty per cent. in the life of wheels and in the wear of journals and brasses, with entire immunity also from broken axles. A very considerable gain is also claimed in traction, so that the same engines can haul heavier trains than with the ordinary trucks.

We are informed that these trucks are manufactured by the Timms Car Company, at Columbus, Ohio, and that their capacity has been thoroughly tested upon steam as well as on horse roads. Cars with these trucks, carrying from 15 to 20 tons of load, are in regular service on steam roads, and are said to stand the severest tests by running at extra speed upon curves, reverse curves, and switches, and under conditions that would have caused ordinary cars with rigid wheels to leave the track. An examination of a model of this truck justifies the impression that in its construction it is sufficiently strong and substantial, with no liability to get out out of square, or to need frequent repairs. The independent movement of the wheels is secured by having an axle for each, which obviates tortional strain, and gives to each axle and wheel a perfectly free action unaffected by curves or inequalities of track. The stability and safety of this plan can only be satisfactorily determined by actual service. We can only say, let it be judged by its performance, instead of being *pre*-judged and sent in advance to the limbo of forgotten things, merely because it is one of the many attempts to introduce independent wheels on steam roads.

IT is reported that the Pittsburg Car Works are to be removed to Youngstown, Ohio, before the 1st of July.

THE Allen Paper Car Wheel Co. has purchased a large tract of land at Morris, and will erect an extensive paper mill for the manufacture of straw boards to be used in its paper wheel works at Pullman, near Chicago.

THE Champion Barbed Wire Fencing, manufactured by the Crandal Manufacturing Co., of Chicago, appears to be a decided improvement upon the long sharp thorn or spur barb set rigidly upon twisted wire, for the reason that there is far less chance of lacerating the flesh of animals that come in contact with it. Its construction also is such as to present a much larger surface than the ordinary wire fencing, thus lessening the liability of stock to run blindly against it, particularly horses. This fencing is well protected against rust, either by being painted or galvanized, costs less per rod than any sold at the same price per pound, and has more tensile strength. Messrs. Brewster & Phelps, of Chicago, are the sole agents of the manufacturers.

IT is hard to decide which is the most pestilential —the young bore who is forever bragging what he is going to do, or the old bore who is eternally bragging of what he has done.

A PRECOCIOUS boy of six years, listening wearily to a long-winded tale, related by a prosy relative, took advantage of a short pause to say slyly, "I wish that story had been brought out in numbers!"

JOHNNY, have you learned any thing during the week?" asked a teacher of a five-year-old pupil. "Yeth'm." "Well, what is it?" "Never to lead a small trump when you hold both bowers."

A MAINE man who said he didn't care two shakes of a lamb's tail about the newspapers, rode 14 miles through a fierce snow storm to get a copy of a weekly that spoke of him as "a prominent citizen."

"MADAME," said a trance medium, "your husband's spirit wishes to communicate with you." "No matter," said the widow, "if he has got no more spirit in the other world than he had in this it is not worth bothering about."

A RECIPE for making soup: Take a pail of water and wash it clean, then boil it till it is brown on both sides, pour in one bean, when the bean begins to worry, prepare to simmer. If soup won't simmer, it's too rich; pour in more water; dry the water with a towel before you put it in. The dryer the water, the sooner it browns. Serve hot.

THERE is a model old man out West who has never taken a bit of care of himself; has chewed tobacco 60 years and got fat on it; drunk hard for 25 years, and grown younger every day; reads his newspaper through an inverted microscope to make the type suit his vision; walks four miles for a drink before breakfast; chops a cord of wood between meals, and has tried to die of old age 13 times and failed every time. He attends to the wants of an old and feeble grandson, and superintends the funerals of his posterity with great care and assiduity.

Our Directory.

We note the following changes since our last issue. Readers are requested to give us prompt notice of changes when they occur:

Boston & Lowell.—Mr. Arthur A. Hobart, having resigned his position as Superintendent, the vacancy will not be filled at present. Mr. J. F. Crockett, Master Mechanic, is appointed Master of Transportation also, and will have charge of the motive power, shops and machinery.

Cairo & Vincennes.—Mr. G. H. Lyman will act as Purchasing Agent, vice T. W. Fitch, resigned.

Cleveland, Tuscarawas Valley & Wheeling.—Mr. W. F. Turreff has resigned as Master Mechanic, to take the position of Superintendent of the Indianapolis Division of the C., C., C. & I. road, in place of C. C. Gale.

Lake Shore & Michigan Southern.—Mr. Edward Studley, Master Mechanic of Buffalo Division, has resigned, and is succeeded by Mr. J. S. Graham.

Louisville & Nashville.—Mr. E. Marsh has been appointed Acting Superintendent of the South & North Alabama Division, vice B. Dunham, resigned, to become General Manager of the Virginia Midland.

Northern Pacific.—Mr. C. T. Hobart has been appointed Superintendent of the Dakota Division, with office in Fargo, Dak.

Ohio & Mississippi.—Mr. Wilson H. Reily has been appointed Master Mechanic of the Springfield Division, with office at Pana, Ill.

Philadelphia & Erie.—The position of Master Mechanic at Kane, Pa., has been abolished, and Mr. W. L. Holman, the former incumbent, is now round-house foreman at Renovo, Pa.

Pittsburg, Cincinnati & St. Louis.—Mr. Wm. F. Black, heretofore Private Secretary of General Manager Caldwell, has been appointed Superintendent of the Cin. & Musk. Valley Division in place of C. C. Waite, resigned.

Rochester & State Line.—The name of this road has been changed to Rochester & Pittsburg. Mr. Geo. E. Merchant, formerly of the Dakota Southern, is General Manager.

Rock Island & Peoria.—Mr. H. B. Ludlow, is appointed Superintendent, with headquarters at Rock Island.

Texas & St. Louis.—Mr. J. W. Brown has been appointed General Superintendent. He has heretofore been Superintendent of Texas Division of the Iron Mountain & Southern.

Wabash, St. Louis & Pacific.—Mr. E. N. Armstrong has been appointed Superintendent of the Iowa Division, with office at Keokuk, Ia.

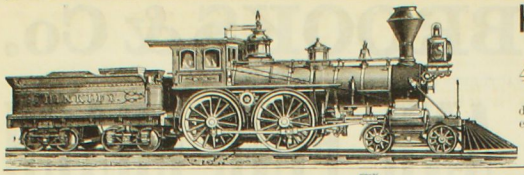
Wisconsin Central.—Mr. J. B. Henney has been appointed Superintendent of Machinery and Motive Power. He has heretofore been on the Southern Division of the Chicago, Milwaukee & St. Paul.

Safety-Heaters for Postal Cars.

POST-OFFICE DEPARTMENT,
WASHINGTON, D. C., Jan. 6, 1881.

At the request of the general superintendent of railway mail service, the postmaster-general desires to impress upon the management of all railway companies the importance of substituting safety-heaters for all other stoves now in use in the railway post-office cars or route agents' apartments. The only safety-heaters approved by the department are those carrying water, so placed as to extinguish the fire in case the car should be overturned. The heaters must also be firmly bolted to the floor and side of the car, and the top or cover of the heater must be secured by an iron rod passing over it. Such safety-heaters are required by the department to be placed in all new postal cars and upon those undergoing repairs, and if railway companies would make their use universal, it would, in case of accident, prove very advantageous to both the companies and the department, as by using them the occurrence of fires in railway postal cars would be almost absolutely prevented, the railroad property would thereby be preserved; and the probability of the destruction of mails by fire be reduced to the minimum. Recent railway accidents have demonstrated the absolute necessity of placing saws, axes and a hatchet in each car or mail apartment, and railway companies are urgently requested to supply these implements as speedily as possible. HORACE MAYNARD, Postmaster General.

WANTED.—A position as Superintendent of Motive Power and Machinery, by a man of large practical experience in the locomotive departments of railroads, and who can furnish the best of references. Address, W. M. S., Continental Hotel, Twentieth street and Broadway, New York.



HINKLEY LOCOMOTIVE COMPANY.

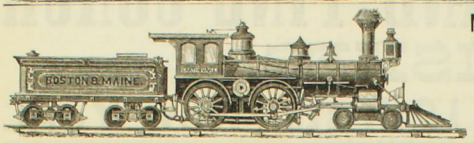
(ESTABLISHED IN 1839.)

439 ALBANY ST., BOSTON, MASS.

This Company, having been reorganized, is prepared to receive orders for Locomotive Engines and Tenders, Boilers and Tanks, and to execute such orders promptly at fair prices for the best work.

FRANKLIN D. CHILD, Superintendent.

GREELY S. CURTIS, Treasurer.



MANCHESTER LOCOMOTIVE WORKS,

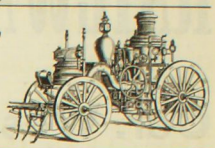
MANUFACTURERS OF

LOCOMOTIVES

AND THE

AMOSKEAG STEAM FIRE-ENGINE.

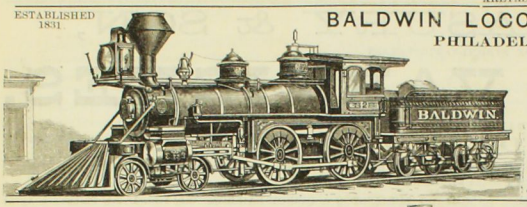
JOHN A. BURNHAM, President.
WM. G. MEANS, Treas., Boston, Mass.
ARETAS BLOOD, Agent, Manchester, N. H.



ESTABLISHED 1831

BALDWIN LOCOMOTIVE WORKS,

PHILADELPHIA, PA.



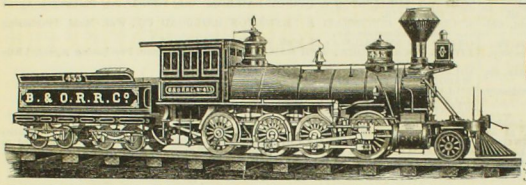
BURNHAM, PARRY, WILLIAMS & CO., PROPRIETORS,

GEO. BURNHAM, CHAS. T. PARRY, EDWARD H. WILLIAMS, } MANUFACTURERS OF { WM. P. HENSZEY, EDW. LONGSTRETH, JOHN H. CONVERSE.

LOCOMOTIVE ENGINES,

Adapted to every variety of service, and built accurately to standard gauges and templates. Like parts of different engines of same class perfectly interchangeable. Passenger and Freight Locomotives, Mine Locomotives, Narrow Gauge Locomotives, Steam Street Cars, etc.

Illustrated Catalogues furnished on application of customers. All work thoroughly guaranteed.



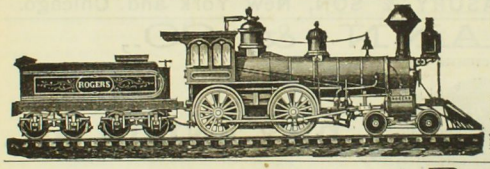
DANFORTH LOCOMOTIVE & MACHINE CO.

PATERSON, N. J.

NEW YORK OFFICE, 115 BROADWAY.

H. A. ALLEN, Agent.

JOHN COOKE, President. J. T. BLAUVELT, Vice-Pres. } PATERSON, N. J. { WM. BERDAN, Sec. & Treas. JAMES COOKE, Supt.



ROGERS LOCOMOTIVE & MACHINE WORKS,

PATERSON, N. J.

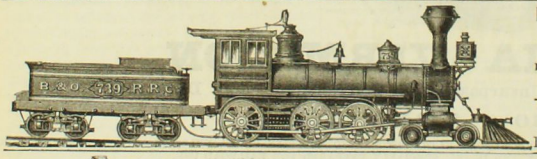
New York Office, 44 Exchange Place.

MANUFACTURERS OF

Locomotive Engines and Tenders and other Railroad Machinery.

J. S. ROGERS, President.
R. S. HUGHES, Secretary. } PATERSON, N. J.
WM. S. HUDSON, Sup't.

R. S. HUGHES, Treas., 44 Exchange Place, New York.



Pittsburgh Locomotive & Car Works,

PITTSBURGH, PA.,

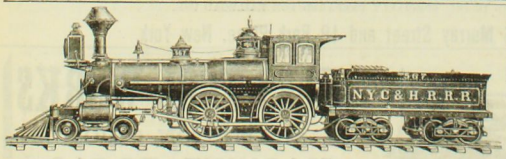
MANUFACTURERS OF

Locomotive Engines for Broad or Narrow Gauge Roads,

From standard designs, or according to specifications, to suit purchasers.

Tanks, Locomotive or Stationary Boilers Furnished at Short Notice.

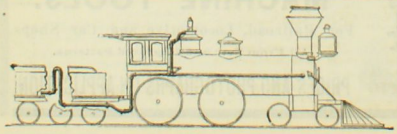
D. A. Stewart, Prest. D. A. Wightman, Supt. Wilson Miller, Sec. & Treas.



SCHENECTADY LOCOMOTIVE WORKS.

CHAS. G. ELLIS, President. EDWARD ELLIS, Treasurer.
WALTER McQUEEN, Vice-President.

SCHENECTADY, N. Y.



THE ASHTON VALVE CO.,

271 Franklin Street, Boston, Mass.

The Ashton Blow-back Safety Valve is constructed so as to conduct the escape steam which is blown off back to the feeder, or to the smoke box and up the chimney. By this arrangement the heat of the escape steam, instead of being wasted as is when an ordinary safety valve blows off, is communicated to the cold water in the tender. This not only results in an important economy, but it renders the escaping steam noiseless, and the increas of temperature of the water has a tendency to deposit some of its impurities beforeit is pumped into the boiler. It thus *stops the noise! saves fuel! and all engines steam better and faster, and do more effective work with these valves* than with those in ordinary use.

Directory of Master-Mechanics and Master Car-Builders

THROUGHOUT THE UNITED STATES AND CANADA.

REFERENCES.—* Mechanical Engineer. † Mechanical Superintendent. ‡ General Master Mechanic. †† Gen. Master Car-Builder. § Master of Machinery. ‖ General Foreman. ** Supt. of Machinery. §§ Supt. of Motive Power and Machinery. ‡‡ Supt. Cars and Buildings. ¶ Supt. of Equipment. ¶¶ Ass't Supt. of Equipment.

A

Railroad.	*Master-Mechanic.*	*Master Car-Builder.*	*Residence.*
Adirondack	Jacob Myers	James J. Traver	Saratoga, N. Y.
Alabama Central	Simon Gay	James Owens	Selma, Ala.
Alabama Great Southern	M. J. Meehan	Geo. Hobert	Chattanooga, Tenn.
Albany & Susquehanna	§§R. C. Blackall	R. C. Blackall	Albany, N. Y.
Albany & Susquehanna	C. A. Jones	J. R. Skinner	Oneonta, N. Y.
Arkansas Midland	J. B. Johnson	J. B. Johnson	Helena, Ark.
Ashtabula & Pittsburg	Geo. J. Parkins	Wm. Marquis	Allegheny City, Pa.
Atchison, Topeka & Santa Fe	§§Geo. Hackney	Henry Hall	Topeka, Kan.
Atchison, Topeka & Santa Fe	A. C. Stiles		Pueblo, Col.
Atchison, Topeka & Santa Fe	C. Hackney		Topeka, Kan.
Atchison, Topeka & Santa Fe	John Fagan		Atchison, Kan.
Atchison, Topeka & Santa Fe	J. M. Smith		Kansas City, Mo.
Atchison, Topeka & Santa Fe	W. W. Wheeler		Emporia, Kan.
Atchison, Topeka & Santa Fe	E. H. Esterbrook		Nickerson, Kan.
Atchison, Topeka & Santa Fe	J. Q. Adams		Dodge, Kan.
Atchison, Topeka & Santa Fe	H. W. Somers		Raton, N. M.
Atchison, Topeka & Santa Fe	A. T. Allen		Las Vegas, N. M.
Allegheny Valley	G. W. Glass	R. Gunning	Pittsburg, Pa.
Atlanta & Charlotte Air-Line	C. D. Wall	C. D. Wall	Atlanta, Ga.
Atlanta & West-Point	Wm. Rushton		Atlanta, Ga.
Atlanta & West-Point		R. D. Cole	Newnan, Ga.
Atlantic & North Carolina	Basil Manly		New Berne, N. C.
Atlantic, Mississippi & Ohio			
Norfolk & Peter. Division	J. T. Robinett	J. T. Robinett	Petersburg, Va.
Virginia & Tenn. Division	F. Sterk	W. A. Morgan	Lynchburg, Va.
Atlantic & Pacific	G. B. Simonds		Albuquerque, N.M

B

Baltimore & Ohio	§John C. Davis	J. S. Shryack	Baltimore, Md.
Baltimore & Ohio	I. N. Kalbaugh	James H. Mill	Baltimore, Md.
Baltimore & Ohio	Wm. Edwards		Martinsburg, Va.
Baltimore & Ohio	Sam. Houston		Piedmont, Va.
Baltimore & Ohio	E. L. Weigerber		Grafton, W. Va.
Baltimore & Ohio	Robert Maxwell		Cumberland, Md.
Baltimore & Ohio	Chas. Hirsch		Wheeling, W. Va.
Baltimore & Ohio	S. B. Crawford		Parkersb'rg, W.Va.
Central Ohio Division	O. B. Perkins		Zanesville, O.
Ohio & Chicago Division	§W. H. Harrison		Newark, O.
Central Ohio Division	James Stewart		Newark, O.
Central Ohio Division	H. M. Ingler		Bellaire, O.
Lake Erie Division	And. Beckert		Sandusky, O.
Chicago Division	W. Y. Johnston		Garrett, Ind.
Chicago Division	F. J. Gunther		Chicago Junc., O.
Chicago Division	Geo. Wilson		Kingston, Ill.
Pittsburg Division	John E. Sampsel		Connellsville, Pa.
Baltimore & Potomac	§§R. H. Soule		Baltimore, Md.
Bath & Hammondsport	Allen Wood		Ham'ondsp't, N. Y.
Bedford, Springville, O. & Bloom'd	Capt. Geo. Elliott		Bedford, Ind.
Bellefonte & Snow-Shoe	H. D. Landis	H. D. Landis	Bellefonte, Pa.
Bennington & Rutland	G. W. Blanchard		Rutland, Vt.
Boston & Albany	§§A. B. Underhill	J. B. Weston	Springfield, Mass.
Boston & Albany		††F. D. Adams	Allston, Mass.
Boston & Albany	T. B. Purvis		Greenbush, N. Y.
Boston & Albany		J. E. Doran	E. Albany, N. Y.
Boston & Providence	George Richards	John Lightner	Roxbury, Mass.
Boston, Barre & Gardner	Chas. F. Brigham		Worcester, Mass.
Boston, Concord & Montreal	Ralph Adams	L. D. Pickering	Lake Village, N. H.
Boston & Maine	Wm. Smith		Boston, Mass.
Boston & Maine		D. C. Richardson	Lawrence, Mass.
Boston & Lowell	J. F. Crockett	J. F. Crockett	Boston, Mass.
Boston & New York Air-Line			New Haven, Conn.
Boston, Revere Beach & Lynn	J. L. Folsom	John Coghlan	Boston, Mass.
Brunswick & Albany			Brunswick, Ga.
Burlington & Missouri River in Neb.	D. Hawksworth	D. Hawksworth	Flattsmith, Neb.
Burlington, Cedar Rapids & Nor.	R. W. Bushnell	R. W. Bushnell	Cedar Rapids, Ia.
Burlington & Southwestern		A. B. Allen	Farmington, Ia.
Buffalo & Southwestern	J. G. Hubbard		Buffalo, N. Y.
Buffalo, New York & Philadelphia	Allen Vail		Buffalo, N. Y.

C

Cairo & St. Louis	**Geo. W. Prescott	Geo. W. Prescott	E. Carondelet, Ill.
Cairo & Vincennes	A. Van Tuyl	A. Van Tuyl	Carmi, Ill.
California, Pacific & Northern	D. Rutherford	D. Rutherford	So. Vallejo, Cal.
Camden & Atlantic	Rufus Hill	S. Wills	Camden, N. J.
Canada Central	†T. Irwin		Brockville, Can.
Canada Southern and Branches	*John Ortton	††John Ortton	St. Thomas, Ont.
Canada Division	W. A. Short	Robert Potts	St. Thomas, Ont.
U. S. Division	O. P. Dunbar		Grosse Isle, Mich.
Carolina Central	§Jas. Mapleton	S. R. Ethridge	Laurinburg, N. C.
Catasauqua & Fogleswille	Tho. E. Evans	Chas. J. Holbach	Catasauqua, Pa.
Central of Georgia	D. D. Arden	R. M. Barshlemas	Savannah, Ga.
Atlanta Division	D. M. Engel	Jas. A. Knight	Macon, Ga.
Central of New Jersey	Wm. Woodcock	George Hackett	Elizabeth, N. J.
Lehigh & Susquehanna Div.	L. C. Brastow	L. C. Brastow	Wilkesbarre, Pa.
Central of Iowa	M. C. Wheeler	T. L. Seevers	Marshalltown, Ia.
Central Pacific	‡A. J. Stevens	††Benj. Welch	Sacramento, Cal.
Central Pacific		‖G. J. Turner	Sacramento, Cal.
Western Division	Geo. D. Welch	W. B. Ludlow	Oakland, Cal.
Visalia Division	S. Johnson		Tulare, Cal.
Sacramento & Oregon Div.	M. W. Cooley	Phil. Douglas	Sacramento, Cal.
Truckee Division	Geo. Gregg	Wm. McPherson	Wadsworth, Nev.
Humboldt Division	W. F. Smith	J. C. Doughty	Carlin, Nev.
Salt Lake Division	Jas. Lamb		Terrace, Utah.
Salt Lake Division		‖A. Sherburne	Ogden, Utah.
Central Vermont	§§J. M. Foss		St. Albans, Vt.
New London & Northern Div.	J. W. Dow	S. O. Banks	New London, Conn.
Rutland Division	N. L. Davis	N. L. Davis	Rutland, Vt.
Chesapeake & Ohio	§John McFarland	J. N. King	Richmond, Va.
Chesapeake & Ohio	Tho. L. Chapman	H. C. Bassinger	Huntingdon, W. Va.
Cheraw & Darlington	John Bissette	W. H. Day	Florence, S. C.
Cherokee	C. E. Scruton		Cedartown, Ga.
Cheshire	F. A. Perry	F. A. Perry	Keene, N. H.
Charlotte, Columbia & Augusta		J. C. Troeger	Columbia, S. C.
Charleston & Savannah	H. A. Ulmo	J. D. Murphy	Charleston, S. C.
Chicago & Pacific	James Penny	C. N. Code	Chicago, Ill.
Chicago & Northwestern	** Geo. W. Tilton	††William Campbell	Chicago, Ill.
Iowa Division	J. O. Chapman	H. L. Preston	Clinton, Ia.
Peninsula Division	Geo. White		Escanaba, Mich.
Winona & St. Peters Div.	W. A. Scott	W. A. Scott	Winona, Minn.
Chicago & Alton	§§Wm. Wilson		Bloomington, Ill.
Kansas City & St. Louis Div.	J. T. Todd		Mexico, Mo.
Chicago, Burlington & Quincy	§§H. B. Stone	*J. Chistiansen	Aurora, Ill.
Chicago Division	W. D. Rowley		Aurora, Ill.
Galesburg Division	Robert Colville		Galesburg, Ill.
Iowa Division	Joel West		Burlington, Ia.
Iowa Division	C. W. Eckerson		Creston, Ia.
St. Louis Division	L. E. Johnson		Beardstown, Ill.
Chicago & Springfield	W. B. McKenna		Clinton, Ill.
Chicago, Clinton, Dubuque & Minn.	E. Smedley	E. Smedley	Dubuque, Ia.
Chicago, Rock Island & Pacific	R. Biester		Chicago, Ill.
Chicago, Rock Island & Pacific	Jas. E. Morrill		Davenport, Ia.
Chicago, Rock Island & Pacific	‡T. B. Twombly	B. K. Verbryck	Chicago, Ill.
Keokuk & Des Moines Div.	S. W. Wakefield	Henry Kummer	Keokuk, Iowa.
Southwestern Division	R. O. Carscadin		Trenton, Mo.
Iowa Division	J. G. Crockett		Stuart, Ia.
Chicago & West Michigan	Russell Booth		Muskegon, Mich.
Chicago & Eastern Illinois	Allen Cooke	Jas. T. Kerney	Danville, Ill.
Chicago & Iowa	H. S. Bryan		Aurora, Ill.
Chicago, Milwaukee & St. Paul	J. M. Lowry		Milwaukee, Wis.
La Crosse & P. Du Ch. Div		John Ballie	Milwaukee, Wis.
Northern Division		Wm. E. Kittredge	Milwaukee, Wis.
Iowa & Minn. Division	J. O. Pattie		Minneapolis, Minn.
Racine & S. West Div	John Taylor	E. A. Eddy	Racine, Wis.
Sioux City & Dak. Div.	J. H. Moulton		Yankton, Dak.
Southern Minnesota Div			Hokah, Minn.
Chicago & Paducah	T. J. Grosh	T. J. Grosh	Streator, Ill.
Chicago, Pekin & Southwestern	A. R. Overton		Joliet, Ill.
Chicago, Pekin & Southwestern		F. Shields	Streator, Ill.
Chicago, St. Louis & New Orleans	**W. H. Purdy		McComb C'y, Miss.
Chicago, St. Louis & New Orleans	E. D. Anderson		McComb C'y, Miss.
Chicago, St. Louis & New Orleans	J. M. Keith		Jackson, Tenn.
Chicago, St. Louis & New Orleans	J. F. White		Water Valley, Miss.
Chicago, St. Paul, Minn. & Omaha	Matt Ellis		Shakopee, Minn.
Chicago, St. Paul, Minn. & Omaha		J. R. Reniff	Sioux City, Ia.
Cincinnati, Wabash & Michigan	S. B. Tinker	S. B. Tinker	Wabash, Ind.
Cincinnati, Hamilton & Dayton	James Eckford	W. H. H. Allison	Cincinnati, O.
Cin., Ind., St. Louis & Chicago	‖J. S. Patterson	J. S. Patterson	Cincinnati, O.
Cincinnati, Richmond & Chicago	Wesley S. Brewer		Richmond, Ind.
Cin. Rockport & So. Western	B. W. Smith	J. H. Bauman	Rockport, Ind.
Cincinnati, Sandusky & Cleveland	Jos. L. Porter		Sandusky, O.
Cincinnati Southern	J. Ivanson		Ludlow Ky.
Cleve., Col., Cin. & Indianapolis	‡L. S. Young	††L. S. Young	Cleveland, O.
Indianapolis Division	A. R. McAlpine		Brightwood, Ind.
Columbus & Cin. Division	F. G. Kaufnolz	Wm. Cleave	Cleveland, O.
Cleveland & Marietta	Tho. Robertson	Tho. Robertson	Marietta, Ohio.
Cleveland & Pittsburg	N. E. Chapman	N. E. Chapman	Cleveland, O.
Cleve., Mt. Vernon & Columbus	J. W. Holloway	J. W. Holloway	Akron, O.
Cleve., Tusc. Valley & Wheeling	Tho. Ransom	Geo. H. Pratt	Black River, O.
Cobourg, Peterboro & Marmora	Wm. Polson		Cobourg, Canada.
Columbia & Greenville	W. J. Parrish		Helena, S. C.
Columbus & Hocking Valley	I. G. Hutchins	J. M. Rockafield	Columbus, O.
Columbus & Toledo	I. G. Hutchins	J. M. Rockafield	Columbus, O.
Concord	J. T. Gordon	J. T. Gordon	Concord, N. H.
Concord & Portsmouth	J. T. Gordon	J. T. Gordon	Concord, N. H.
Concord & Claremont	**J. N. Lauder		Concord, N. H.
Connecticut River	§Wm. H. Stearns		Springfield, Mass.
Connecticut Valley	S. E. Brewer	S. E. Brewer	Hartford, Conn.
Connecticut Western	John C. Barton		Hartford, Conn.
Conn. & Passumpsic Rivers	L. L. Brigham	L. F. Woodard	Lyndonville, Vt.
Corning, Cowanesque & Antrim	O. C. Patchell	O. C. Patchell	Corning, N. Y.
Cumberland Valley	A. S. Hull	G. W. Nitterhouse	Chambersburg, Pa.
Cumberland & Pennsylvania	N. W. Howson	Nathan Binnix	Mt. Savage, Md.

D

Dak. So. & Sioux City & Pembina	J. H. Moulton	J. H. Moulton	Yankton, Dak.
Danbury & Norwalk	N. M. George	N. M. George	Danbury, Conn.
Danville & Southwestern	B. L. Baldwin		Danville, Ill.
Danville, Olney & Ohio River	Louis Parisoe		Kansas, Ill.
Davenport & Northwestern	H. E. Woods		Davenport, Ia.
Dayton & Union	H. S. Gordon	H. S. Gordon	Dayton, O.
Dayton & Southeastern	F. McCreery		Dayton, O.
Dayton & Michigan	John Black		Lima, O.
Delaware, Lackawanna & West.	Walter Dawson	Robert McKenna	Scranton, Pa.
Morris & Essex Division	W. H. Lewis		Kingsland, N. J.
Morris & Essex Division		J. W. Baker	Dover, N. J.
Oswego & Syracuse Division	James Buchanan		Syracuse, N. Y.
Utica, Chenango & Susq. Div.	Tho. Thatcher		Utica, N. Y.
Bloomsburg Division	Charles Graham		Kingston, Pa.
Delaware & Chesapeake	Jos. A. Baynard		Easton, Md.
Delaware & Hudson Canal Co	**R. C. Blackall		Albany, N. Y.
Delaware & Hudson Canal Co		T. Orchard	Carbondale, Pa.
Rensselaer & Saratoga Div.	J. L. Corey	Chr. Körner	Green Island, N. Y.
Denver Pacific	§R. McDougall	John Clock	Denver, Col.
Denver & Rio Grande	N. W. Sample	N. W. Sample	Denver, Col.
Des Moines & Fort Dodge	John McGrnyel	E. A. Avery	Grand Junction, Ia.
Detroit & Bay City	R. P. Baillie		Bay City, Mich.
Detroit, Grand Haven & Mil.	Fred Parker		Detroit, Mich.
Detroit, Lansing & Northern	C. C. Watrous	G. C. Watrous	Ionia, Mich.
Dorchester & Delaware			Cambridge, Md.
Dunkirk, Allegheny Val. & Pitts	J. C. Haggett	J. C. Haggett	Dunkirk, N. Y.

E

East Broad Top	Wm. C. Maynes		Orbisonia, Pa.
Eastern		J. D. Billings	Salem, Mass.
Eastern	D. S. Wallis		East Boston, Mass.
Eastern Kentucky	D. L. Weaver	D. L. Weaver	Riverton, Ky.
E. Tennessee, Virginia & Georgia	C. A. Hodge,	Joseph Armbruster	Knoxville, Tenn.
Erie & Pittsburg	J. N. Wood	J. N. Wood	Erie, Pa.
Eureka & Palisade	J. M. Alson		Eureka, Nev.
European & North Am. (of Maine)	A. O. Bailey	A. O. Bailey	Mattawamk'g, Me.
Evansville & Terre Haute	John L. White	Joseph Suker	Evansville, Ind.

F

Fitchburg	§§Geo. A. Cooledge	J. W. Marden	Charlestown, Mass.
Vermont & Mass. Div.	W. A. Foster		Fitchburg, Mass.
Flint & Pere Marquette	T. J. Hatswell	T. J. Hatswell	E. Saginaw, Mich.
Florida Central	James S. McElroy	James S. McElroy	Jacksonville, Fla.
Flushing, North Shore & Central	Thomas Meehan	Edward Riley	L. I. City, N. Y.
Fort Wayne & Jackson	C. W. Hollister		Jackson, Mich.
Fort Wayne, Muncie & Cincinnati	Wm. McPhail	Wm. McPhail	Fort Wayne, Ind.

G

Galv., Harrisburg & San Antonio	§§D. T. Davis	Jas. Alexander	Harrisburg, Tex.
Galveston, Houston & Henderson	J. G. Conlon		Galveston, Tex.
Geneva, Ithaca & Sayre	J. N. Weaver		Waverly, N. Y.
Georgia	John S. Cook	T. M. Preval	Augusta, Ga.
Grand Haven	A. S. Parish		Allegan, Mich.
Grand Tower & Carbondale	Hugh Smith	Hugh Smith	Grand Tower, Ill.
Grand Trunk	‡Herbert Wallis	Wm. McWood	Montreal, Canada.
Grand Trunk		Warren Noyes	Gorham, N. H.
Grand Trunk		Duncan Menish	Portland, Me.
Chicago Division	*K. Blackwell		Battle Creek, Mich.
Grand Rapids & Indiana	J. M. Boon		Fort Wayne, Ind.
Grand Rapids & Indiana	J. R. Fish	J. R. Fish	Grand Rapids, Mich.
Grayville & Mattoon	C. H. Cory		Mattoon, Ill.
Great Western, of Canada	†C. K. Dorneville		Hamilton, Can.
Great Western, of Canada	C. F. Hanson	Henry Childs	London, Ont.
Green Bay & Minnesota	Edw Osborne		Green Bay, Wis.
Gulf, Colorado & Santa Fe	Geo. B. Nicols	W. H. Martin	Galveston, Texas.

H

Hanover Junction & Gettysburg	John J. Bingley	John J. Bingley	Hanover, Pa.
Hannibal & St. Joseph	**Tho. G. Gorman	Tho. G. Gorman	Hannibal, Mo.
Havana, Rantoul & Eastern	J. McCarthy		Rantoul, Ill.
Housatonic	N. Slingland	J. J. Ferris	Falls Village, Conn.
Houston, East & West Texas	J. E. Wiggin		Houston, Tex.
Houston & Texas Central	L. C. Noble	James McGee	Houston, Tex.
Huntingdon & Broad Top	Wm. Barkla		Saxton, Pa.

I

Illinois Central	**S. J. Hayes	W. B. Snow	Chicago, Ill.
Chicago Division	Henry Schlacks		Chicago, Ill.
South Division	David Oxley		Centralia, Ill.
North Division	J. B. Edams		Amboy, Ill.
Iowa Division	Thomas W. Place		Waterloo, Ia.
Springfield Division	W. B. McKenna		Clinton, Ill.
Illinois Midland	R. N. Pringle		Paris, Ill.
Illinois & St. Louis	J. H. Smith		Belleville, Ill.

Railroad.	*Master-Mechanic.*	*Master Car-Builder.*	*Residence.*
Illinois & St. Louis		Charles Rothe	E. St. Louis, Ill.
Indianapolis, Decatur & Springfield	Pulaski Leeds	Pulaski Leeds	Indianapolis, Ind
Indianapolis, Peru & Chicago	John McKenna	John McKenna	Peru, Ind.
Indianapolis & St. Louis	A. J. Sanborn	A. J. Sanborn	Mattoon, Ill.
Indiana, Bloomington & Western	C. A. Thompson	C. A. Thompson	Urbana, Ill.
International & Great Northern	R. H. Johnson	H. H. Sessions	Palestine, Tex.
Intercolonial	†H. A. Whitney	Edw. Shaffer	Moncton, N. B.
Iron	Perry Scott	Clem. Roetling	Ironton, O.
J			
Jacksonville, Pensacola & Mobile	Jas. D. Hollister		Tallahassee, Fla.
Jeffersonville, Mad. & Indianapolis	Wm. Swanston	‖Edw. Austin	Jeffersonville, Ind.
Jacksonville, N. West. & S. East	B. J. Miller		Jacksonville, Ill.
Joplin	P. T. Butterly	P. T. Butterly	Girard, Kan.
Junction & Breakwater	J. A. Maguire		Lewes, Del.
K			
Kansas City, Fort Scott & Gulf	J. S. McCrum	A. N. Montier	Kansas City, Mo.
Kansas City, Lawrence & South'n	J. S. McCrum		Kansas City, Mo.
Kan. City, St. Jo. & Coun. Bluff	F. A. Chase	‖Theo. Aylesbury	St. Joseph, Mo.
Kansas Central	Wm. McCall		Leavenworth, Kan.
Kansas Pacific	**John MacKenzie	T. B. Roberts	Armstrong, Kan.
Kaw Valley Division	James Long		Armstrong, Kan.
Smoky Hill Division	John B. Daily		Ellis, Kan.
Denver Division	R. McDougal	Wm. Ogle	Denver, Col.
Kentucky Central	J. R. Ledyard	J. L. Hackathorn	Covington, Ky.
Knox & Lincoln	E. Bolton	C. L. Turner	Bath, Me.
L			
Lake Erie & Western	¶¶Everett Clemons		Fremont, Ohio.
Lake Erie & Western	¶H. L. Cooper		Lafayette, Ind.
Lake Ontario Southern	Geo. Thompson	Wm. Currier	Sodus Point, N. Y.
Lake Shore & Michigan Southern	‡James Sedgley	††John Kirby	Cleveland, Ohio.
Michigan Southern Division	Geo. W. Stevens		Elkhart, Ind.
" " "		Frank O. Bray	Adrian, Mich.
Toledo Division	J. M. Sanborn	W. O. Smith	Norwalk, Ohio.
Erie Division	L. O. Gassett	J. Withyecombe	Cleveland, Ohio.
Buffalo Division	J. S. Graham	A. C. Robson	Buffalo, N. Y.
Lehigh Valley	John I. Kinsey		South Easton, Pa.
Lehigh Valley	P. Hofecker		Weatherly, Pa.
Lehigh Valley	John Campbell		Delano, Pa.
Lehigh Valley	D. Clark		Hazleton, Pa.
Lehigh Valley	A. Mitchell		Wilkesbarre, Pa.
Lehigh Valley		Jno. S. Lentz	Packerton, Pa.
Little Rock & Fort Smith	James Eblin	James Malone	Argenta, Ark.
Little Rock, Miss. River & Texas	Joseph Taylor	Joseph Taylor	Arkans's City, Ark.
Los Angeles & Independence	Jas. Velsir	‖J. S. Young	Los Angeles, Cal.
Louisville, New Albany & Chicago	Geo. H. Ruhlandt	Geo. H. Ruhlandt	New Albany Ind.
Long Island	Jas. Thompson	Jas. Thompson	L. Isl'd City, N. Y.
Louisville, Cincinnati & Lexing'n	A. Schaeffer	A. Schaeffer	Louisville, Ky.
Louisville & Nashville	**Reuben Wells	H. Middleton	Louisville, Ky.
Nashville & Decatur Div	W. H. Thomas	J. P. Furguson	Nashville, Tenn.
South & North Ala. Div	C. W. White		Birmingham, Ala.
St. Louis Div	Thos. Walsh	W. H. H. Price	Mt. Vernon, Ill.
Clarksville Division			Bowling Green, Ky
Memphis & Ohio Div	Wm. Pike		Memphis, Tenn
Mobile & New Orleans Div	Wm. Adair		Mobile, Ala.
M			
Macon & Brunswick	R. Wagnon	R. Wagnon	Macon, Ga.
Maine Central	J. W. Philbrick	J. W. Philbrick	Waterville, Me.
Maine Central		C. H. Kenison	Augusta, Me.
Manchester & Lawrence	J. T. Gordon	J. T. Gordon	Concord, N. H.
Manhattan Beach	Lewis James		Bay Ridge, L. I.
Manhattan Elevated	T. W. Peeples		New York, N. Y.
Marietta & Cincinnati	E. M. Bosley	E. M. Bosley	Chillicothe, Ohio.
Marquette, Houghton & Onton'gn	W. H. Williams	H. D. Lyons	Marquette, Mich.
Memphis, Paducah & Northern	G. M. Taylor	G. M. Taylor	Paducah, Ky.
Memphis & Little Rock	Tho. Rennell	P. Twitchell	Argenta, Ark.
Memphis & Charleston	§H. N. Burford	J. J. Kasey	Memphis, Tenn.
Mexican National	J. C. Munro		City of Mexico.
Michigan Central	S. H. Edgerly		Jackson, Mich.
Michigan Central		††Robert Miller	Detroit, Mich.
Midland of New Jersey	W. C. Ennis		Wortendyke, N. J.
Milwaukee, Lake Shore & West'n	S. Charnley		Manitowoc, Wis.
Minneapolis & St. Louis	Tho. Downing	Tho. Downing	Minneapolis, Minn.
Mineral Point	Robert Hay	Robert Hay	Mineral Pt., Wis.
Mineral Range	George F. Coon		Hancock, Mich.
Mississippi & Tennessee	J. C. Ramsey	S. J. Bolton	Memphis, Tenn.
Missouri & Western	A. C. Persing		Pierce City, Mo.
Missouri Pacific	§§John Hewitt	John Hodge	St. Louis, Mo.
Missouri Pacific	R. D. Grant		St. Louis, Mo.
Missouri Pacific	Geo. W. Walshe		Sedalia, Mo.
Missouri Pacific	H. V. Faries		Atchison, Kan.
Mobile & Montgomery	C. W. White	Lewis Barham	Montgomery, Ala.
Mobile & Girard	J. C. Albrecht	A. J. Nix	Columbus, Ga.
Mobile & Ohio	R. H. Briggs	J. T. Booth	Whistler, Ala.
Mobile & Ohio	John Fitzgerald		Macon, Miss.
Mobile & Ohio	M. T. Carson		Jackson, Tenn.
Montgomery & Eufaula	D. M. Gugel	James A. Knight	Macon, Ga.
Morgan's Louisiana & Texas	N. Tilton	Wm. O'Brien	Algiers, La.
N			
Nashua & Lowell	S. A. Davis	S. A. Davis	Nashua, N. H.
Nashville, Chattan'ga & St. Louis	James Cullen	J. G. Sawyer	Nashville, Tenn.
Naugatuck	Henry Hanford	George W. Gray	Bridgeport, Ct.
Nebraska	D. Hawksworth		Plattsmouth, Neb.
Nevada Central	Wm. Sutcliffe		Battle Mountain, Nev.
Newburg, Dutchess & Connecticut	W. G. Vanbuskirk		Dutchess J'n, N. Y.
New Brunswick	P. A. Logan	P. A. Logan	Fredericton, N. B.
New Brunswick & Canada	Tho. Armstrong	G. Houlton	St. Andrew's, N. B.
New Haven & Northampton	Henry Fox	John Sweeny	New Haven, Ct.
New Jersey & New York	J. S. Drake		Jersey City, N. J.
New Jersey Southern	Rufus Blodgett		Manchester, N. J.
New York, Lake Erie & Western	§§F. M. Wilder		Susquehanna, Pa.
New York, Lake Erie & Western	J. H. Vreeland		Jersey City, N. J.
New York, Lake Erie & Western		‖J. N. Mileham	Jersey City, N. J.
New York, Lake Erie & Western	J. Van Vechten	‖J. Van Vechten	Port Jervis, N. Y.
New York, Lake Erie & Western	V. Blackburn		Susquehanna, Pa.
New York, Lake Erie & Western		‖D. B. Goodell	Elmira, N. Y.
New York, Lake Erie & Western	George H. Griggs		Hornellsville, N. Y.
New York, Lake Erie & Western		‖M. Wilder	E. Buffalo, N. Y.
New York, Lake Erie & Western	‖Jos. Bradt		Rochester, N. Y.
New York & Harlem	Theo. Wheeler		New York, N. Y.
New York & Harlem		C. E. Garey	Morrisania, N. Y.
New York Central & Hud. River		††Leander Garey	New York, N. Y.
New York Central Division	§§G. B. Van Vorst	D. Hoit	West Albany, N. Y.
New York Central Division	§§Henry Watkeys		Syracuse, N. Y.
New York Central Division	§§Amos Gould	E. A. Olmstead	E. Buffalo, N. Y.
New York Central Division	§§S. L. White	Richard Donaby	Niagara Falls, N. Y.
Hudson River Division	§§Wm. Buchanan	Peter Smith	New York, N. Y.
New York Central Division		C. H. Burchard	E. Rochester, N. Y.
New York, Ontario & Western	Edw. Minshull	Edw. Minshull	Middletown, N. Y.
New York & New England	§§Geo. E. Boyden	Elias E. Pratt	Boston, Mass.
Norwich & Worcester Div	Richard Colburn		Norwich, Ct.
Hartford Division	E. M. Humstone	S. Howland	Hartford, Conn
New York, N. Haven & Hartford	§§H. Kettendorf	James Denver	New Haven, Ct.
Hartford Division	§§Jno. Henney, Jr.	L. Packard	Hartford, Ct.
New York, Penn. & Ohio	‡William Fuller	Wm. Fuller	Cleveland, O.
New York, Penn. & Ohio	J. A. Cooper	D. S. Dockstader	Meadville, Pa.
New York, Penn. & Ohio	N. Wright	W. G. Huggard	Cleveland, O.
New York, Penn. & Ohio		S. V. Smith	Kent, O.
New York, Penn. & Ohio	William Hill	J. W. Holmes	Galion, O.
New York, Penn. & Ohio		‖J. T. Fosdick	Salamanca, N. Y
New York, Penn. & Ohio		‖Geo. Wilson	Dayton, O.
New York, Providence & Boston	J. H. Anderson	J. H. Anderson	Providence, R. I.
Northern Central	§§R. H. Soule	‖G. W. Demarest	Baltimore, Md.
Northern Central	J. M. Coale		Baltimore, Md.
Northern Central	James Strode	‖J. C. Dyott	Elmira, N. Y.
Northern New Hampshire	**Jas. N. Lauder		Concord, N. H.
Northern of Canada	Peter Clark	Peter Clark	Toronto, Can.
Northern Pacific	**A. P. Farrar	A. P. Farrar	Brainerd, Minn.
Dakota Division	A. Rupert		Fargo, Dak.
Pacific & P. Oreille Div	‖C. Z. Sanders	Tho. G. Davis	New Tacoma, W. T
Northeastern		W. H. Day	Florence, S. C.
North Pacific Coast	James Walch		Saucelito, Cal.
Northern & Northwestern	P. Clark		Toronto, Can.
O			
Ogdensburg & Lake Champlain	Abraham Klohs	A. Klohs	Malone, N. Y.
Ohio Central	J. B. Morgan		Bucyrus, O.
Ohio & Mississippi	‡J. F. Sechler		Vincennes, Ind.
Ohio & Mississippi		J. P. Coulter	Aurora, Ind.
Cincinnati Division	John Thumser		Seymour, Ind.
Springfield Division	W. H. Reilly		Pana, Ill.
Old Colony	J. K. Taylor	A. Gleason	Boston, Mass.
B. C. F. & N. Bedford Div	Geo. W. Reynolds	Sam. Stevens	Taunton, Mass.
Olean, Bradford & Warren	Chas. Turner	Chas. Turner	Olean, N. Y.
Oregon & California	§§J. Brandt		Portland, Oregon
Oregon Railway & Navigation Co	J. F. Curtis	Chas. Phipps	The Dalles, Oregon
P			
Paducah & Elizabethtown	W. D. Robb	W. D. Robb	Elizabethtown, Ky
Painesville & Youngstown	J. H. Jones		Painesville, O.
Panama	Thos. S. O'Brien		Aspinwall, U. S. C.
Parker & Karns City	Philip Davies	Wm. Wolford	Parker City, Pa.
Pensacola & Selma	R. H. Kelly		Selma, Ala.
Pennsylvania	§§T. N. Ely		Altoona, Pa.
Pennsylvania	H. D. Garrett	I. W. Van Houten	W. Philadelphia, Pa
Pennsylvania	E. L. Caum	Samuel W. Myers	Harrisburg, Pa.
Pennsylvania	G. W. Strattan	John P. Levan	Altoona, Pa.
Pennsylvania	D. O. Shaver	J. G. Stewart	Pittsburg, Pa.
New Jersey Division	L. A. Bosdevex	E. F. Bosdevex	Meadow Shops, N. J
New Jersey Division		David H. Baker	Jersey City, N. J.
New Jersey Division	§§H. S. Hayward		Jersey City, N. J.
New Jersey Division	Tho. Kerr	P. S. Bogart	So. Amboy, N. J.
New Jersey Division	R. McDowell		Lambertville, N. J
New Jersey Division	W. McAllister		Camden, N. J.
West Penn. Division	C. B. Street	M. H. Fails	Blairsville, Pa.
Peoria, Decatur & Evansville	P. Reilly		Pekin, Ill.
Peoria, Pekin & Jacksonville	R. F. Hurd	R. F. Hurd	Pekin, Ill.
Peoria & Springfield	I. Blovelt	J. G. Evans	Peoria, Ill.
Petersburg	R. B. Andrew	J. W. Fleming	Petersburg, Va.
Philadelphia, Wilmington & Balt	S. A. Hodgman	Wm. Lungren	Wilmington, Del
Philadelphia & Atlantic City	J. W. Wright	E. Lippincott	Camden, N. J.
Philadelphia & Erie	§§Howard Fry		Williamsport, Pa.
Philadelphia & Erie	W. F. Beardsley		Sunbury, Pa.
Philadelphia & Erie	W. L. Forster		Renovo, Pa.
Philadelphia & Erie	W. T. Smith		Erie, Pa.
Philadelphia & Baltimore Central	S. D. Danfield	S. D. Danfield	Chester, Pa.
Philadelphia & Reading	*L. B. Paxson	John H. Rankin	Reading, Pa.
Catawissa Branch	W. H. Ellis	C. D. Ellis	Catawissa, Pa.
Germantown & Norris'n Div	Jackson Richards		Philadelphia, Pa.
North Penn. Division	Jackson Richards	C. W. Hammann	Philadelphia, Pa.
Del. & Bound Brook Div	Jackson Richards		Philadelphia, Pa.
Piedmont Air Line	‡R. D. Wade		Richmond, Va.
Rich. & Danville Div		J. B. Vaughan	Richmond, Va.
North Carolina Div		J. C. Holt	Comp. Shops, N. C.
Pittsburg, Cincinnati & St. Louis	§§G. W. Rhodes		Columbus, O.
Little Miami Division	J. H. Setchel	John McVay	Cincinnati, O.
Little Miami Division		M. P. Ford	Columbus, O.
Col., Cin. & Ind. Division	Robert Curtis	‖Tho. Chamberlin	Columbus, O.
Col., Cin. & Ind. Div	Geo. H. Prescott	‖Chas. H. Starr	Logansport, Ind.
Col. Cin. & Ind. Division	‖C. M. St. Clair		Indianapolis, Ind.
Cin. & Musk. Val. Division	Leroy Kells	‖Daniel Jewell	Lancaster, O.
Pitts. Cin. & St. Louis Divis'n	Ross Kells		Dennison, O.
Pitts. Cin. & St. Louis Divis'n		‖A. K. Mansfield	Steubenville, O.
Pittsburg, Fort Wayne & Chicago	Geo. J. Parkin	John Marquis	Allegheny, Pa.
Pittsburg, Fort Wayne & Chicago	J. M. Boon	Israel Lee	Fort Wayne, Ind
Pittsburg, Fort Wayne & Chicago		J. J. Kirkland	Crestline, O.
Pittsburg, Titusville & Buffalo	H. J. Bookhammer	John Monks	Oil City, Pa.
Pittsburg, Virginia & Charleston	Wm. Lininger		Pittsburg, Pa.
Pittsburg & Western	D. C. Courtney		Zelienople, Pa.
Pittsburg & Lake Erie	S. W. Haines		Pittsburg, Pa.
Portland & Ogdensburg	Geo. H. Poor	W. G. Brewer	Portland, Me.
Portland & Rochester	E. H. C. Tompson	David Dow	Portland, Me.
Port Dover & Lake Huron	H. M. Aldrich		Woodstock, Ont.
Port Royal & Augusta	Geo. Riley	J. H. Milton	Port Royal, S. C.
Poughkeepsie, Hartford & Boston	John L. Driscoll		Poughkeepsie, N. Y
Prince Edward Island	A. Stronach	‖D. M. Fraser	Charlottet'n, P. E. I
Providence & Springfield	G. T. Richardson		Pascoag, R. I.
Providence & Worcester	A. Griggs	A. Griggs	Providence, R. I.
Providence, Warren & Bristol	Rufus Smith	Rufus Smith	Bristol, R. I.
Q			
Quebec, Mont., Ottawa & Occidental	†A. Davis		Montreal, Can
Quincy, Missouri & Pacific			Kirksville, Me.
R			
Raleigh & Augusta Air-Line	**B. R. Harding		Raleigh, N. C.
Raleigh & Gaston	**B. R. Harding	R. T. Bishop	Raleigh, N. C.
Rhinebeck & Connecticut	John Dykeman	John H. Decker	Rondout, N. Y.
Rich., Fredericksburg & Potomac	H. Khun	W. H. Trainham	Richmond, Va.
Richmond & Allegheny	Geo. D. Harris		Richmond, Va.
Richmond & Danville	See Piedmont Air-Line.		
Richmond & Petersburg	John O'Brien	H. L. Carter	Richmond, Va.
Rich., York River & Chesapeake	A. B. Armstrong	A. B. Armstrong	Richmond, Va.
Rio Grande	G. W. Rendall	M. Markwood	Brownsville, Tex.
Rochester & Pittsburg	A. J. Robbins		Rochester, N. Y.
Rock Island & Peoria	Joseph Elder		Peoria, Ill.
Rome, Watertown & Ogdensburg	Geo. H. Hazleleton	Geo. H. Hazlton	Oswego, N. Y.
Rome, Georgia	O. W. Harbin	O. W. Harbin	Rome, Ga.
S			
Saginaw Valley & St. Louis			St. Louis, Mich.
San Francisco & Northern Pacific	Ed. Reynolds	John Martin	Donahue, Cal.
Savannah, Florida & Western	§Chas. Collins	‖P. N. Raynal	Savannah, Ga.
Savannah & Memphis	R. A. Bridges		Opelika, Ala.
Scioto Valley	C. H. Cory	C. H. Cory	Portsmouth, O.
Seaboard & Roanoke	§§M. M. Pendleton		Portsmouth, Va.
Selma, Rome & Dalton	B. J. Sitton	W. W. Pierce	Selma, Ala.
Selma, Marion & Memphis	J. M. Levis		Marion, Ala.
Sheboygan & Fond du Lac	John Hickey	John Hickey	Sheboygan, Wis.
Shenango & Allegheny	Edw. Richardson		Greenville, Pa.
Shepaug	C. M. Allen		Litchfield, Ct.
Sioux City & Pacific	C. H. Foster	C. H. Foster	Missouri Valley, Ia.
Sioux City & St. Paul	F. C. Butterfield	F. C. Butterfield	Shakopee, Minn.
Southern Pacific.			
Northern Division	J. T. Wilson	F. N. Bellisle	San Francisco, Cal
Los Angeles & Yuma Div	Jas. Velsir	‖J. S. Young	Los Angeles, Cal.
Tulare Division	S. Johnson		Tulare, Cal.
South Carolina	§P. J. Cochrane	Geo. H. Gramling	Charleston, S. C
Southern Central	Chas. G. Brown	H. Mooney	Auburn, N. Y.
Southeastern (Canada)	A. G. Eastman		Richford, Vt.
Southwestern of Georgia	D. M. Gugel	James A. Knight	Macon, Ga.
South Pacific Coast	E. L. Reese	Martin Carter	Newark, Cal.

Railroad.	Master Mechanic.	Master Car-Builder.	Residence.
Spartanburg, Union & Columbia	Wm. Platt	W. B. Brown	Spartanburg, S. C.
Spartanburg & Asheville	M. Fraser	W. B. Brown	Spartanburg, S. C.
Springfield, Athol & Northeastern	W. E. Granger		Springfield, Mass.
Springfield Southern	F. W. Johnstone		Springfield, O.
State Line & Sullivan	J. O. Blight		Towanda, Pa.
Stockton & Copperopolis	John M. Fulton		Stockton, Cal.
St. Croix & Penobscot	G. H. Corsen	H. C. Tincker	Milltown, Me.
St. Johns	Jas. M. Owens		St. Augustine, Fla.
St. Johnsbury & Lake Champlain	Geo. E. Howe		St. Johnsbury, Vt.
S. Joseph & Des Moines	F. A. Chase		St. Joseph, Mo.
St. Joseph & Western	E. Sleppy	E. Sleppy	So. St. Joseph, Mo
St. Lawrence & Ottawa	Calvin Dame	Calvin Dame	Prescott, Canada.
St. Louis, Iron Mount. & So	**O. A. Haynes	Oscar Doolittle	St. Louis, Mo
Arkansas Division	L. Finlay	L. Finlay	Little Rock, Ark.
Missouri Division	W. H. Harris	H. M. Aldrich	De Soto, Mo.
St. Louis, Alton & Terre Haute	**Beriah Warren		St. Louis, Mo.
St. Louis, Salem & Little Rock	Thomas Everson	A. W. Grosvernor	Steelville, Mo.
St. Louis & San Francisco	M. Kearney	M. Kearney	N. Springfield, Mo
St. Louis, Keokuk & Northwest'n	Wm. Foley		Keokuk, Iowa.
St. Louis Bridge Co. & Tunnel R.R.	H. M. Smith		St. Louis, Mo.
St. Paul & Duluth	W. McFarland	John Hill	St. Paul, Minn.
St. Paul, Minneapolis & Manitoba	A. A. Ackerly		St. Paul, Minn.
St. Paul & Sioux City	Matt Ellis		Shakopee, Minn.
Sussex	E. H. Osborn	R. L. Sutton	Newton, N. J.
Syracuse, Binghamton & N. Y.	James Buchanan	James Buchanan	Syracuse, N. Y.
Syracuse, Chenango & New York	Geo. W. West		Syracuse, N. Y.
T			
Tennessee & Pacific	William McKeand	William McKeand	Nashville, Tenn.
H. & Indianapolis (Vandalia Line. Indianapolis Div.	§C. R. Peddle	E. D. Carter	Terre Haute, Ind.
Vandalia Div.	Clinton Idler		Indianapolis, Ind
Logansport Division	Chas. Butler		Effingham, Ill.
Texas & New Orleans	A. J. Prescott	H. L. Clark	Logansport, Ind.
Texas & Pacific	D. C. Smith	J. M. Mather	Houston, Texas.
Brazos Division	H. J. Small	F. M. Alexander	Marshall, Texas.
Tioga	D. E. Greve		Dallas, Tex.
Toledo, Delphos & Burlington	Pere Bonny	D. H. Stratton	Blossburg, Pa.
Toronto, Grey & Bruce	F. M. Mast		Delphos, O.
Toronto & Nipissing	†David Preston		Toronto, Can.
Troy & Boston	J. Haggas		Toronto, Can.
	Z. B. Davis	R. V. Coon	Troy, N. Y.
U			
Ulster & Delaware	J. B. Dykeman	Jno. H. Decker	Rondout, N. Y.

Railroad.	Master Mechanic.	Master Car Builder.	Residence.
Union Pacific	§L. H. Congdon	‡Geo. E. Stevens	Omaha, Neb.
Eastern Division		A. M. Collett	Omaha, Neb.
Eastern Division		H. P. Makely	Grand Island, Neb
Mountain Division	T. A. Davis	John E. Davis	Cheyenne, Wy. T.
Laramie Division		Floyd Heavaner	Laramie, Wy. T.
Western Division		R. V. Brinkley	Evanston, Wy. T.
Colorado Division	James S. Scott	E. G. Thomas	Golden, Col.
Denver, S. Park & Pacific Div			Denver, Col.
Kansas Division	**John MacKenzie	J. B. Roberts	Kansas City, Mo.
Kansas Division	J. B. Daily		Ellis, Kan.
Utah Central	W. B. Armstrong	Sam. S. Tucker	Salt Lake City.
Utah Western	Robert Anderson		Salt Lake City, U.
Utica & Black River	John Bailey	David James	Utica, N. Y.
Utica, Ithaca & Elmira	Geo. W. Cleveland	F. W. Magargil	Bresseport, N. Y.
V			
valley	Amos Pilsbury	Chas. Blanchard	Cleveland, O.
Vicksburg & Meridian	Jas. B. Browne		Vicksburg, Miss.
Vicksburg, Shreveport & Pacific	W. Bell Smith	W. Bell Smith	Monroe, La.
Virginia & Truckee	I. N. Fording		Carson, Nev.
Virginia Midland	J. E. Waddey	J. T. Nallo	Alexandria, Va.
W			
Wabash, St. Louis & Pacific	Chauncy R. Morris		Fort Wayne, Ind
Wabash, St. Louis & Pacific	Jacob Johann	B. B. Rose	Springfield, Ill.
Wabash, St. Louis & Pacific	W. O. Hewitt	R. M. Hemphill	Peoria, Ill.
Wabash, St. Louis & Pacific		U. H. Kohler	Toledo, Ohio.
Wabash, St. Louis & Pacific		J. S. Hazen	Stanbery, Mo.
Wabash, St. Louis & Pacific	W. H. Selby	C. S. Buck	Moberly, Mo.
Wallkill Valley	John Dykeman	Jno. H. Decker	Rondout, N. Y.
Washington & Ohio	Edward Dunn	John Harrison	Alexandria, Va.
Welland	James Taylor	Wm. H. Fay	St. Catharine, C.W.
Westchester & Philadelphia	§S. D. Danfield	S. D. Danfield	Chester, Pa.
Western & Atlantic	John H. Flynn	W. G. Grambling	Atlanta, Ga.
Western Maryland	‡David Holtz	J. H. Nussear	Union Bridge, Md.
Western North Carolina	Geo. W. Gates		Salisbury, N. C.
Western, of Alabama	Robert King	F. M. Wade	Montgomery, Ala.
Western R. R. N. C.	Isaac W. Clark	Isaac W. Clark	Fayetteville, N. C
Western Union	John Taylor	E. A. Eddy	Racine, Wis.
West Feliciana	J. A. Tilton	Wm. McKelvey	Laurel Hill, La.
West Jersey	W. McAllister	C. C. Williams	Camden, N. J.
White Water	§L. W. Wingert		Harrison, O.
Wilmington, Columbia & Augusta	John Bisset	W. H. Day	Florence, S. C.
Wilmington & Welden	John Bisset	C. R. Clowe	Wilmington, N. C.
Wisconsin Central	§‡J. B. Henney	J. B. Henney	Stevens' Pt, Wis.
Wisconsin Valley	M. B. Snyder		Tomah, Wis.
Worcester & Nashua	John G. Brady	John G. Brady	Worcester, Mass.

Directory of Railway Superintendents and Purchasing Agents

THROUGHOUT THE UNITED STATES AND CANADA.

References.—* General Manager. † General Superintendent. ‡ Assistant General Superintendent. § Assistant Superintendent. ** Superintendent of Transportation. §§ Assistant General Manager.

A

Railroad.	Superintendent.	Purchasing Agent.	Residence.
Adirondack	C. E. Durkee		Saratoga, N. Y.
Alabama Central	John M. Bridges		Selma, Ala.
Alabama Great Southern	*John Scott	R. W. Healey	Chattanooga, Tenn.
Alabama Great Southern	Chas. B. Wallace		Chattanooga, Tenn.
Albany & Susquehanna	*C. F. Young		Honesdale, Pa.
Alleghany Valley	David McCargo	David McCargo	Pittsburg, Pa.
Anderson, Lebanon & St. Louis	Jas. A. Larnerd		Anderson, Ind.
Arkansas Midland	*A. H. Johnson		Helena, Ark.
Ashtabula & Pittsburg	D. B. McCoy		Ashtabula, O.
Atchison, Topeka & Santa Fe	*W. B. Strong	F. M. Smith	Topeka, Kan.
Southern Division	A. A. Robinson		Las Vegas, N. M.
Eastern Division	D. J. Chase		Topeka, Kan.
Atlanta & Charlotte Air Line	*G. J. Foreacre	G. J. Foreacre	Atlanta, Ga.
Atlanta & West Point	*L. P. Grant		Atlanta, Ga.
Atlantic & North Carolina	A. B. Andrews		Newbern, N. C.
Atlantic & Pacific	F. W. Smith		Albuquerque, N.M.
Atlantic, Mississippi & Ohio	Geo. Hoffman	J. P. Minetree	Petersburg, Va.
Atlantic, Tennessee & Ohio	J. J. Gormley		Charlotte, N. C.

B

Railroad.	Superintendent.	Purchasing Agent.	Residence.
Baltimore & Ohio	**W. M. Clements	N. S. Hill	Baltimore, Md.
Ohio & Chicago Division	C. H. Hudson		Chicago, Ill.
Baltimore & Potomac	Geo. C. Wilkins	A. W. Sumner	Baltimore, Md.
Bangor & Piscataquis	Arthur Brown		Bangor, Me.
Bath & Hammondsport	M. H. Hall		Hamm'dsp't, N. Y.
Bedford, Sp'gville, Owensb'g & Bd.	Jas. W. Kennedy	Jas. W. Kennedy	Bedford, Ind.
Bellefonte & Snow Shoe	Daniel Rhoads		Bellefonte, Pa.
Bell's Gap	Robert G. Ford		Bellwood, Pa.
Bennington & Rutland	F. C. White	F. C. White	Rutland, Vt.
Blairstown	J. D. Vail		Blairstown, N. J.
Boston, Revere Beach & Lynn	E. H. Whorf		Boston, Mass.
Boston & Albany	*Wm. Bliss		Boston, Mass.
Boston & Albany	C. O. Russell		Springfield, Mass.
Boston & New York Air Line	Jos. H. Franklin		New Haven, Conn.
Boston & Providence	A. A. Folsom	A. A. Folsom	Boston, Mass.
Boston Concord & Montreal	*J. A. Dodge		Plymouth, N. H.
Boston, Concord & Montreal	§W. A. Stowell	J. Thomas Vose	Boston, Mass.
Boston, Hoosac Tunnel & Western	E. B. Burnham		Mechanicsville, N.Y.
Boston & Maine	J. T. Furber	J. T. Furber	Boston, Mass.
Boston & Lowell		F. H. Nourse	Boston, Mass.
Boston, Barre & Gardner	H. M. Witter	H. M. Witter	Worcester, Mass.
Bradford, Bordell & Kinzua	B. C. Williams	B. C. Williams	Bradford, Pa.
Brooklyn, Flatbush & Coney Isl'd.	W. E. Dorwin		Brooklyn, N. Y.
Brunswick & Albany	R. D. Meader		Brunswick, Ga.
Burlington & Mo. River (in Neb.)	*A. E. Touzalin	G. Hargreaves	Omaha, Neb.
Burlington & Mo. River (in Neb.)	Geo. W. Holdrege		Omaha, Neb.
First Division	J. O. Phillipi		Lincoln, Neb.
Burlington, Cedar Rapids & Nor'n.	C. J. Ives	Theo. Stickney	Cedar Rapids, Ia.
Burlington & Northwestern	John F. Gerry	John F. Gerry	Burlington, Ia.
Burlington & Southwestern	J. W. Smith	J. W. Smith	Burlington, Ia.
Buffalo & Southwestern	*John F. Moulton		Buffalo, N. Y.
Buffalo, New York & Philadelphia	Geo. S. Gatchell	J. H. Pool	Buffalo, N. Y.

C

Railroad.	Superintendent.	Purchasing Agent.	Residence.
Cairo & St. Louis	Chas. Hamilton	Chas. Hamilton	St. Louis, Mo.
Cairo & Vincennes	Roswell Miller	G. H. Lyman	Cairo, Ill.
California Pacific & Northern	§J. A. Fillmore		Sacramento, Cal.
Camden & Atlantic	F. A. Lister	F. A. Lister	Camden, N. J.
Canada Central	*Archer Baker		Brockville, Can.
Canada Southern	*Wm. P. Taylor		Buffalo, N. Y.
Canada Southern		A. F. Howland	St. Thomas, Ont.
U. S. Division	E. P. Murray		Toledo, O.
Canada Division	W. E. Carroll		St. Thomas, Ont.
Canadian Pacific	J. F. Lynskey		Winnepeg, Man.
Carbondale & Shawneetown	R. J. Cavett		Carbondale, Ill.
Carolina Central	V. Q. Johnson	C. H. Roberts	Wilmington, N. C.
Catasauqua & Fogelsville	C. W. Chapman	C. W. Chapman	Catasauqua, Pa.
Cayuga Southern	W. Stevenson		Sayre, Pa.
Cayuga & Susquehanna	W. R. Humphreys		Ithaca, N. Y.
Cazenovia, Canastota & De Ruyter	John Stebbins		Cazenovia, N. Y.
Central Pacific	*A. N. Towne		San Francisco, Cal.
Central Pacific	J. A. Fillmore		San Francisco, Cal.
Central Pacific		J. R. Watson	Sacramento, Cal.
Western & Visalia Divisions	A. D. Wilder		Oakland, Cal.
Truckee Division	Frank Free		Wadsworth, Nev.
Humboldt Division	G. W. Coddington		Carlin, Nev.
Salt Lake Division	A. G. Fell		Ogden, Utah.
Sacramento & Oregon Div	R. H. Pratt		Sacramento, Cal.
Central Vermont	J. W. Hobart		St. Albans, Vt.
Central Vermont	‡J. M. Foss		St. Albans, Vt.
Western Division	John Schrier		Ogdensburg, N. Y.
Northern Division	J. B. Futooys		St. Johns, P. Q.
Rutland Division	J. Burdett		Rutland, Vt.
New London Northern	G. W. Bentley	G. W. Bentley	New London, Conn.
Central of Georgia	Wm. Rogers	Henry Yonge	Savannah, Ga.
Atlanta Division	W. F. Shellman		Macon, Ga.
Central of Iowa	D. N. Pickering	D. N. Pickering	Marshalltown, Ia.
Central of New Jersey	James Moore	B. W. Burnet	Elizabeth, N. J.
Central Division	‡W. W. Stearns		Elizabeth, N. J.
Lehigh & Susq. Division	W. S. Polhemus		Mauch Chunk, Pa
Champaign, Havana & Western	A. H. Wood		Urbana, Ill.
Charleston & Savannah	C. S. Gadsden		Charleston, S. C.
Charlotte, Columbia & Augusta	G. R. Talcott	G. R. Talcott	Columbia, S. C.
Chesapeake & Ohio	W. M. S. Dunn	J. A. Netherland	Richmond, Va.
Cheraw & Darlington	J. F. Divine		Society Hill, S.
Cherokee	John Postell		Atlanta, Ga.
Cheshire	*R. Stewart	H. H. Stone	Keene, N. H.
Chester & Lenoir	James Mason		Chester, S. C.
Chicago & Northwestern	*Marvin Hughitt	R. W. Hamer	Chicago, Ill.
Chicago & Northwestern			Chicago, Ill.
Chicago & Northwestern	§Chas. C. Wheeler		Chicago, Ill.
Wisconsin & Mill. Division	E. J. Cuyler		Chicago, Ill.
Peninsula Division	W. B. Lindsay		Escanaba, Mich
Madison Division	C. A. Swineford		Baraboo, Wis.
Galena Division	Chas. Murray		Chicago, Ill.
Des Moines & Iowa Division	J. M. Whitman		Clinton, Iowa.
Winona & St. Peter Division	S. Sanborn		Winona, Minn.
Dakota Central Division	T. J. Nichols		Huron, Dak.
Galena & Wisconsin Br	J. B. Trull		Galena, Ill.
Chicago & Alton	*J. C. McMullen	A. V. Hartwell	Chicago, Ill.
Chicago & Alton	C. H. Chappell		Bloomington, Ill.
Chicago Division	A. M. Richards		Chicago, Ill.
Kansas City St. Louis Div	O. Vaughan		Mexico, Mo.
Chicago & Block Coal	*A. F. Beach		Veedersburg, Ind.
Chicago, Burlington & Quincy	*Thos. J. Potter	Wm. Irving	Chicago, Ill.
Chicago, Burlington & Quincy	§John D. Besler		Galesburg, Ill.
Chicago, Burlington & Quincy	§E. Ryder		Chicago, Ill.
Eastern Div	C. M. Levy		Chicago, Ill.
Middle Galesb'g & Q'y Div	H. Hitchcock		Galesburg, Ill.
St. Louis & R. Isl'd Division	W. R. Crumpton		St. Louis, Mo.
Iowa Division	W. C. Perkins		Burlington, Iowa.
Chi., Clinton, Dubuque & Minn	*F. O. Wyatt	F. O. Wyatt	Dubuque, Iowa.
Chicago & Eastern Illinois	O. S. Lyford	O. S. Lyford	Chicago, Ill.
Chicago & Iowa	W. H. Holcomb, *Rec*		Rochelle, Ill.
Chicago & Northeastern	J. M. Turner		Lansing, Mich.
Chicago & Pacific	*J. M. Whitman	James Penny	Chicago, Ill.
Chicago & Paducah	D. H. Conklin		Streator, Ill.
Chicago & Paducah		C. L. Rising	Chicago, Ill.
Chicago, St. Louis & New Orleans	*J. C. Clarke	J. C. Febiger, Jr	New Orleans, La.
South Division	W. P. McKinley		McComb City, Miss.
North Division	J. G. Mann		Jackson, Tenn.
Chicago, Rock Island & Pacific	A. Kimball		Davenport, Iowa.
Chicago, Rock Island & Pacific	‡A. Manvel	A. Manvel	Chicago, Ill.
Southwestern Division	G. F. Walker		Trenton, Mo.
Iowa Division	H. F. Royce		Des Moines, Iowa
Illinois Division	R. H. Chamberlin		Chicago, Ill.
Keokuk & Des Moines Div	John Given		Keokuk, Ia.
Chicago & West Michigan	§C. M. Lawler		St. Joseph, Mich.
Chicago, Milwaukee & St. Paul	W. C. Van Horne	J. T. Crocker	Milwaukee, Wis.
Ch., LaCrosse & P. du C. Div.	H. C. Atkins		Milwaukee, Wis.
Northern Division	L. B. Rock		Milwaukee, Wis.
I. & M., & I. D. Division	C. H. Prior		Minneapolis, Minn.
Wabasha Division	J. H. Lakey		Wabasha, Minn.
Western Union Division	D. A. Olin		Racine, Wis.
Sioux City & Dak. Div	G. W. Sanborn		Sioux City, Ia.
Southern Minnesota Div	J. M. Egan	J. M. Egan	La Crosse, Wis
Chicago, Pekin & Southwestern	J. Murray	A. H. Cook	Chicago, Ill.
Chicago, St. Paul, Minn. & Omaha	Chas. F. Hatch	W. H. S. Wright	St. Paul, Minn.
Chippewa Falls & Western	L. C. Stanley		Chip'wa F'lls, Wis.
Cincinnati & Eastern	George H. Wilber		Batavia, O.
Cincinnati, Wabash & Michigan	*Norman Beckley	Norman Beckley	Elkhart, Ind.
Cincinnati, Wabash & Michigan	O. W. Lamport		Wabash, Ind.
Cincinnati, Richmond & Chicago	*Lewis Williams		Cincinnati, O.
Cincinnati, Rockp't & Southwest'n.	H. C. Branham	H. C. Branham	Rockport, Ind.
Cincinnati & Terre Haute	John Holland		Terre Haute, Ind.
Cin., Cumber'd Gap & Charleston	W. J. Taylor		Knoxville, Tenn.
Cincinnati, Hamilton & Dayton	*Lewis Williams	Lewis Williams	Cincinnati, O.
Cin., Hamilton & Indianapolis	Lewis Williams		Cincinnati, O.
Cin., Sandusky & Cleveland	*D. W. C. Brown	Frank Herriman	Sandusky, O.
Cincinnati Southern	Sam'l Woodward	Julius Uihlein	Cincinnati, O.
Cin., Indianapolis, St. Louis & Chi	J. W. Sherwood		Indianapolis, Ind
Cin., Indianapolis, St. Louis & Chi		George Tozzer	Cincinnati, O.
Cleve., Col., Cin. & Indianapolis	*E. B. Thomas	J. L. Yale	Cleveland, O.
Indianapolis Division	W. F. Turreff		Indianapolis, Ind
Col. and Cincinnati Divs	Robert Blee		Cleveland, O.
Cleveland & Marietta	S. C. Baldwin	R. B. Hoover	Marietta, Ohio.
Cleveland & Pittsburg	John Thomas		Cleveland, O.
Cleveland & Pittsburg	*J. D. Layng	Wm. Mullins	Pittsburg, Pa.
Cleveland, Mt. Vernon & Columb's	G. A. Jones		Mt. Vernon, O.
Cleve., Tuscarawas Val. & Wheel.	*Oscar Townsend		Cleveland, O.
Cobourg, Petersboro & Marmora	James R. Barber	J. R. Barber	Cobourg, Ont.
Columbia & Greenville	*T. M. R. Talcott		Richmond, Va.
Columbia & Greenville	J. W. Fry		Columbia, S. C.
Columbus & Hocking Valley	Orland Smith		Columbus, O.
Columbus & Toledo	Orland Smith	Geo. R. Carr	Columbus, O.
Columbus & Rome	T. J. Nuckolls		Columbus, Ga.
Concord & Claremont	George E. Todd		Concord, N. H.
Concord	H. E. Chamberlin	H. E. Chamberlin	Concord, N. H.
Concord & Portsmouth	H. E. Chamberlin		Concord, N. H.
Connecticut Central	D. D. Warren, Pres		Springfield, Mass.
Connecticut River	John Mulligan	John Mulligan	Springfield, Mass.
Connecticut Valley	Samuel Babcock		Hartford, Conn.
Connecticut Western	J. F. Jones		Hartford, Conn.
Connecticut & Passumpsic Rivers.	H. E. Folsom		Lyndonville, Vt.
Corning, Cowanesque & Antrim	A. H. Gorton	Andrew Beers	Corning, N. Y.
Covington, Col. & Black Hills	J. I. Booge		Sioux City, Iowa.
Credit Valley	H. G. Taylor		Toronto, Ont.
Cumberland Valley	J. F. Boyd	O. N. Lull	Chambersburg, Pa.
Cumberland & Pennsylvania	P. L. Burwell	P. L. Burwell	Cumberland, Md.
Cumberland & Maurice River	L. H. Dowdney		Port Norris, N. J.

D

Railroad.	Superintendent.	Purchasing Agent.	Residence.
Danbury & Norwalk	L. W. Sandiforth		South Norwalk, C.
Danville & Southwestern	James A. Eads		Paris, Ill.
Danville, Olney & Ohio River	*Chas. Howard		Kansas, Ill.
Davenport & Northwestern	D. Flanigan		Davenport, Ill.
Dayton & Michigan	E. E. Dwight		Toledo, O.
Dayton & Union	C. C. Gale		Indianapolis, Ind.
Dayton & Southeastern	J. E. Gimperling, *Rec*	E. F. Pryor	Dayton, O.
Delaware & Chesapeake	O. S. Sanford		Easton, Md.
Delaware & Hudson Canal Co.	R. Manville	R. Manville	Carbondale, Pa.
Delaware & Hudson Canal Co.	*C. F. Young		Honesdale, Pa.
Albany & Susq. Division	C. D. Hammond		Albany, N. Y.
Rensselaer & Saratoga Div	Theo. Voorhees		Troy, N. Y.
Delaware, Lackawanna & Western		G. W. B. Cushing	New York City.
Delaware, Lackawanna & Western	W. F. Hallstead		Scranton, Pa.
Bloomsburg Division	G. Bogart		Scranton, Pa.
Morris & Essex Division	Andrew Reasoner		Hoboken, N. J.
Oswego & Syracuse Division	W. B. Phelps		Oswego, N. Y.
Utica, Chenango & Sus. Div.	F. J. Griffiths		Scranton, Pa.
Delaware Western	David Connell		Wilmington, Del.
Denver & Rio Grande	*D. C. Dodge		Denver, Col.
Denver & Rio Grande	George W. Cushing		Denver, Col.
Denver & Rio Grande		A. B. Garner	Colorado Spr's, Col.
First Division	W. W. Hungerford		Denver, Col.
Second Division	E. R. Dougherty		La Veta, Col.
Des Moines, Northwestern	C. N. Gilmore		Des Moines, Iowa.
Des Moines & Ft. Dodge	C. N. Gilmore	C. N. Gilmore	Des Moines, Iowa.
Detroit & Bay City	S. R. Callaway	Allan Bourn	Detroit, Mich.
Detroit, Gr. Haven & Milwaukee	W. J. Morgan	John S. Lorimer	Detroit, Mich.
Detroit, Hillsdale & Southwestern	W. F. Parker		Ypsilanti, Mich.
Detroit, Lansing & Northern		Allan Bourn	Detroit, Mich.
Detroit, Lansing & Northern	T. M. Fish		Ionia, Mich.
Dorchester & Delaware	Tho. E. Wright		Cambridge, Md.
Dunkirk, Allegheny Val. & Pitts	D. Thayer		Dunkirk, N. Y.
Dunkirk, Allegheny Val. & Pitts		R. C. Moore	New York City.

E

Railroad.	Superintendent.	Purchasing Agent.	Residence.
East Broad Top	A. W. Sims		Orbisonia, Pa.
East Alabama	W. W. Barnes		Opelika, Ala.
East Line & Red River	W. B. Ward		Jefferson, Tex.
East Tenn., Virginia & Georgia	**J. F. O'Brien	J. Y. Johnston	Knoxville, Tenn.
Eastern	**D. W. Sanborn	Geo. J. Fisher	Boston, Mass.
Eastern Kentucky	*H. W. Bates	H. W. Bates	Riverton, Ky.
Eastern Shore	W. Thompson		Prince Anne, Md.
Erie & Pittsburg	J. M. Kimball		Erie, Pa.
Erie & Pittsburg	*J. D. Layng	Wm. Mullins	Pittsburg, Pa.
Eureka & Palisade	P. Evarts		Palisade, Nev.
European & North American	F. W. Cram		Bangor, Maine.
Evansville & Terre Haute	J. E. Martin	Jno. L. White	Evansville, Ind.

F

Railroad.	Superintendent.	Purchasing Agent.	Residence.
Fitchburg	John Adams	F. S. Pratt	Boston, Mass.
Vermont & Mass. Div	‡E. K. Turner		Fitchburg, Mass
Flint & Pere Marquette	Sanford Keeler	G. G. Cook	E Saginaw, Mich.
Florida Central	W. M. Davidson	W. M. Davidson	Jacksonville, Fla.
Flushing, North Shore & Central	Samuel Spencer	Samuel Spencer	L'g Isl'd C'y, N. Y.
Fonda, Johnstown & Gloversville	L. Caten		Gloversville, N. Y.
Fon du Lac, Amboy & Peoria	A. Kinyon		Fond du Lac, Wis.
Fort Madison & Northwestern	S. B. Kenrick	S. B. Kenrick	Fort Madison, Ia
Fort Wayne & Jackson	M. D. Woodford	M. D. Woodford	Jackson, Mich.
Fort Wayne, Muncie & Cincinnati	W. W. Worthington & P. Ag't		Fort Wayne, Ind.
Foxburg, St. Petersburg & Clarion	Benj. B. Newton		Foxburg, Pa.
Frankfort & Kokomo	J. B. Clark	E. H. Andress	Lafayette, Ind.
Fredericton	F. B. Edgecombe		Fredericton, N. B.
Freehold & New York	J. E. Ralph	J. E. Ralph	Freehold, N. J.

Railroad.	*Superintendent.*	*Purchasing Agent.*	*Residence.*
G			
Gal., Harrisburg & San Antonio	James Converse		Houston, Texas.
Gal., Harrisburg & San Antonio		Chas. Babbidge	Boston, Mass.
Gal., Houston & Henderson	*W. H. Harding	W. H. Harding	Palestine, Texas.
Geneva, Ithaca & Sayre	Wm. Stevenson		Sayre, Pa.
Georgia	S. K. Johnson	S. K. Johnson	Augusta, Ga.
Grand Haven	*F. H. May	F. H. May	Allegan, Mich.
G. Rapids, Newaygo & L. Shore	C. Warner		G. Rapids, Mich.
Grand Rapids & Indiana	W. O. Hughart, Pres't.	W. R. Shelby	G. Rapids, Mich.
Northern Division	J. M. Matheany		G. Rapids, Mich.
Southern Division	P. S. O'Rourke		Fort Wayne, Ind.
Grand Trunk	*J. Hickson	John Taylor	Montreal, Canada.
Grand Trunk	W. J. Spicer		Montreal, Canada.
Chicago Div	H. Funnell		Battle Creek, Mich.
Grand Tower & Carbondale	T. M. Williamson	Wm. W. Harris	Grand Tower, Ill.
Grayville & Mattoon	*G. L. Bradbury		Mattoon, Ill.
Grayville & Mattoon	G. R. Cobleigh		Mattoon, Ill.
Great Western (Canada)	Charles Stiff		Hamilton, Ont.
Great Western (Canada)		G. R. Nash	London, Ont.
Green Bay & Minnesota	*Timothy Case		Green Bay, Wis.
Greenville, Col. & Birmingham	E. P. Buell		Greenville, Miss.
Greenwich & Johnsonville	J. H. Thompson		Greenwich, N. Y.
Gulf, Colorado & Santa Fé	*John Sealey	F. P. Killeen	Galveston, Texas.
Gulf, Western Texas & Pacific	M. D. Monserratte		Cuero, Texas.
H			
Hamilton & Northwestern	*F. W. Cumberland		Hamilton, Ont.
Hannibal & St. Joseph	*John B. Carson	T. L. Dunn	Hannibal, Mo.
Eastern Division	W. R. Woodard		Hannibal, Mo.
Western Division	W. C. Alberger		Kansas City, Mo.
Hanover Junction & Gettysburg	Henry A. Young	H. A. Young	Hanover, Pa.
Harlem Extension South	*R. C. Root		Bennington, Vt.
Havana, Rantoul & Eastern	H. E. Bullock	H. E. Bullock	Rantoul, Ill.
Housatonic	L. B. Stillson		Bridgeport, Conn.
Houston, East & West Texas			Houston, Texas.
Houston & Texas Central	A. H. Swanson	A. H. Swanson	Houston, Texas.
Southern Division	M. G. Howe		Houston, Texas
Northern Division	G. A. Quindan		Corsicana, Texas.
Huntingdon & Broad Top	Geo. F. Gage	S. B. Knight	Huntingdon, Pa.
I			
Illinois Central	E. T. Jeffrey	O. Ott	Chicago, Ill.
Chicago Division	C. A. Beck		Centralia, Ill.
Northern Division	J. C. Jacobs		Amboy, Ill.
Iowa Division	D. W. Parker		Dubuque, Ia.
Springfield Division	T. J. Hudson		Springfield, Ill.
Illinois Midland	L. Genis, *Rec*	J. G. Clifford	Terre Haute, Ind.
Illinois & St. Louis	C. H. Sharman		St. Louis, Mo.
Indiana, Bloomington & Western	§C. E. Henderson	H. C. Norton	Indianapolis, Ind.
Indianapolis, Decatur & Spring	E. H. Goodrich	E. H. Goodrich	Indianapolis, Ind.
Indianapolis & St. Louis	C. C. Gale	H. W. Comstock	Indianapolis, Ind.
Indianapolis, Peru & Chicago	§E. C. Murphy		Indianapolis, Ind.
Indianapolis, Peru & Chicago		John Mc Kenna	Peru, Ind.
Indianapolis & Vincennes	J. J. Turner		Indianapolis, Ind
Intercolonial	D. Pottinger	T. V. Cooke	Moncton, N. B.
Halifax & St. John Division	Jas. Coleman		Truro, N. S.
Northern Division	M. Busby		Campbellt'n, N. B.
International & Great Northern	*H. M. Hoxie	H. M. Hoxie	Galveston, Texas.
Iowa Eastern	H. H. Kerr		Beulah, Iowa.
J			
Jacksonville, N. Western & S. E.	E. S. Greenleaf		Jacksonville, Ill.
Jacksonville, Pen. & Mobile		J. D. Hollister	Tallahassee, Fla.
Jeff., Madison & Indianapolis	E. W. McKenna		Louisville, Ky.
Jeff., Madison & Indianapolis		Wm. Mullins	Pittsburg, Pa.
Junction & Breakwater	Tho. Groome		Lewes, Del.
K			
Kansas Central	W. A. Martin	W. A. Martin	Leavenworth, Kan
Kan. City, Burlington & Santa Fe	James Houston		Burlington, Kan.
Kansas City, Fort Scott & Gulf	L. W. Towne	H. P. Jacques	Kansas City, Mo.
Kansas City, Lawrence & South	L. W. Towne	H. P. Jacques	Kansas City, Mo.
Kan. City, St. Joseph & C. Bluffs	J. F. Barnard		St. Joseph, Mo.
Kansas Pacific	*S. H. H. Clark	A. D. Clark	Omaha, Neb.
Kansas Pacific	S. T. Smith		Kansas City, Mo.
Kaw Valley Division	J. O. Brinkerhoff		Kansas City, Mo.
Smoky Hill Division	J. T. Odell		Ellis, Kansas.
Denver Division	J. T. Odell		Denver, Col.
Cheyenne Division	A. A. Egbert		Denver, Col.
Kent Co. & Smyrna & Del. Bay	J. F. Bingham		Chestertown, Md.
Kentucky Central	*J. D. Ellison		Covington, Ky.
Kingston & Pembroke	B. W. Folger	Wm. Harty	Kingston, Can.
Knox & Lincoln	C. A. Coombs	C. A. Coombs	Bath, Maine.
Knoxville & Ohio	G. J. Kinzel		Knoxville Tenn.
L			
Lake Erie & Western	*E. H. Waldron	E. H. Andress	Lafayette, Ind.
Sandusky Division	D. S. Hill		Fremont, Ohio.
Bloomington Division	M. Clark		Lafayette, Ind.
Lake Ontario Southern	*Jas. E. Briggs		Newark, N. Y.
Lake Shore & Mich. Southern	*John Newell		Cleveland, Ohio.
Lake Shore & Mich. Southern	Charles Paine	A. C. Armstrong	Cleveland, Ohio.
Buffalo & Erie Division	C. B. Couch		Cleveland, Ohio.
Toledo Division	Thos. Fleshen, Jr		Cleveland, Ohio.
Michigan Division	J. F. Curtis		Toledo, Ohio.
Detroit Division	T. J. Charlesworth		Detroit, Mich.
Western Division	J. H. Parsons		Chicago, Ill.
Lansing Division	W. H. Canniff		Lansing, Mich.
Franklin Division	Geo. H. McIntire		Stonebora, Pa.
Lehigh Valley	Robert H. Sayre		Bethlehem, Pa.
Lehigh Valley		L. Chamberlin	Philadelphia, Pa.
Beaver Meadow Division	A. G. Brodhead, Jr		Mauch Chunk, Pa.
Mahanoy Division	James I. Blakslee		Mauch Chunk, Pa.
New Jersey Division	H. E. Packer		Metuchen, N. J.
Wyoming Division	A. Mitchell		Wilkesbarre, Pa.
Levis & Kennebec	W. C. Hall		Quebec, Can.
Ligonier Valley	Thos. A. Mellon		East Liberty, Pa.
Little Rock & Fort Smith	T. Hartman		Little Rock, Ark.
Little Rock, Miss. River & Texas	J. A. Woodson	J. A. Woodson	Pine Bluff, Ark.
Los Angeles & Independence	§W. J. L. Moulton		Los Angeles, Cal.
Long Island	Austin Corbin, *Rec*		L'g Isla'd C'y, N.Y
Louisiana Western	G. W. Polk		Vermillionville, La.
Louisville & Nashville	*F. de Funiak		Louisville, Ky.
Louisville & Nashville	D. W. C. Rowland	G. C. Breed	Louisville, Ky.
St. L. & S. F. & N. & D. Div	James Montgomery	J. N. McCoy	Evansville, Ind.
Memphis Line	J. T. Harrahon		Memphis, Tenn.
Nashville & Decatur Div	James Geddes		Nashville, Tenn.
So. & North Ala. Division	E. Marsh		Birmingham, Ala.
Mobile & New Orleans Div			Mobile, Ala.
Louisville, Cincinnati & Lexington	Wm. Mahl	Wm. Mahl	Louisville, Ky.
Louisville, New Albany & Chicago	John McLeod	Wm. M. Lewis	Louisville, Ky.
Louisville, N. Albany & St. Louis	H. L. Shepherd		New Albany, Ind.
M			
Macon & Brunswick	Jas. M. Edwards	W. C. Jones	Macon, Ga.
Maine Central	Payson Tucker		Portland, Me.
Manchester & Lawrence	H. E. Chamberlin		Concord, N. H.
Manchester & North Weare	H. E. Chamberlin		Concord, N. H.
Manhattan Beach	A. Corbin, *Pres't.*		New York, N. Y.
Manhattan Elevated	§Frank K. Hain		New York, N. Y.
Manhattan Elevated	C. L. Green		New York, N. Y.
Marietta & Cincinnati	Jas. H. Stewart	J. H. Stewart	Cincinnati, O.
Marquette, Hought'n & Ontonag'n	*Samuel Schoch	R. M. McCauley	Marquette, Mich.
McKean & Buffalo	S. V. Godden		Smethport, Pa.
Memphis & Little Rock	*Wm. E. Smith	W. E. Smith	Memphis, Tenn.
Memphis & Little Rock	E. K. Sibley		Memphis, Tenn.
Memphis & Charleston	John A. Grant	John A. Grant	Huntsville, Ala.
Memphis, Paducah & Northern	*N. Monsarrat	N. Monserrat	Paducah, Ky.
Michigan Air Line	*M. S. Hadley		Romeo, Mich.
Michigan Central	*H. B. Ledyard	Allan Bourn	Detroit, Mich.
Michigan Central	‡E. C. Brown		Jackson, Mich.
Mackinaw & Saginaw Div	W. A. Vaughan		Bay City, Mich.
Main Line & G. R. & Kal. Div's	C. B. Bush		Jackson, Mich.
Middleburg & Schoharie	P. S. Demfforth		Middleburg, N. Y.
Middletown & Crawford	D. Thompson		[Thompson, Ridge, N.Y.
Midland of New Jersey	*H. M. Britton		Jersey City, N. J
Midland Railway of Canada	H. G. Taylor		Fort Hope, Ont.
Milwaukee, Lake Shore & West'n	H. G. H. Reed		Milwaukee, Wis.
Mineral Point	G. W. Cobb	G. W. Cobb	Mineral Point, Wis
Mineral Range	*C. E. Holland		Hancock, Mich.
Minneapolis & St. Louis	*Chas. F. Hatch	Chas. F. Hatch	Minneapolis, Minn
Minnesota Midland	J. H. Lakey		Wabasha, Minn.
Mississippi & Tennessee	M. Burke	M. Burke	Memphis, Tenn.
Missouri Pacific	A. A. Talmage	R. B. Lyle	St. Louis, Mo.
Missouri Pacific	‡A. W. Dickinson		St. Louis, Mo.
Eastern Division	O. H. Dorrance		St. Louis, Mo.
Central Branch Division	W. W. Fagan		St. Louis, Mo.
Western Division	Warder Cumming		Sedalia, Mo.
Mobile & Alabama Grand Trunk	F. B. Clark, Prest		Mobile, Ala.
Mobile & Ohio	*A. L. Rives	A. L. Rives	Mobile, Ala.
Northern Division	E. S. Hosford		Jackson, Tenn.
Southern Division	C. Fleming		Mobile, Ala.
Mobile & Girard	W. L. Clark		Columbus, Ga.
Mobile & Montgomery	W. D. Chipley		Montgomery, Ala
Mont Alto	G. B. Weistling		Mont Alto, Pa.
Montgomery & Eufaula	W. F. Shellman		Macon, Ga.
Montpelier & Wells River	W. A. Stowell		Montpelier, Vt.
Montrose	J. I. Blakslee	J. I. Blakslee	Mauch Chunk, Pa.
Morgan's Louisiana & Texas	Geo. Pandeley	C. A. Whitney & Co	New Orleans, La.
Muncy Creek	H. R. Mehrling		Hughesville, Pa.
N			
Nashua, Acton & Boston	H. E. Chamberlin		Concord, N. H
Nashua & Lowell	Chas. E. Paige	Chas. E. Paige	Nashua, N. H.
Nashville, Chattanooga & St. Louis	J. W. Thomas		Nashville, Tenn
Natchez, Jackson & Columbus	J. H. Fitzpatrick		Natchez, Miss.
Naugatuck	Geo. W. Beach	Geo. W. Beach	Waterbury, Conn.
Nebraska	Wm. Irving		Omaha, Neb.
Nevada Central	*Jos. Collett	F. W. Dunn	Battle Mountain, Nev.
Newburg, Dutchess & Connecticut	C. L. Kimball	C. L. Kimball	Dutchess J'n, N.Y.
New Brunswick & Canada	John Stewart		St. Stephen, N. B.
New Brunswick	E. B. Burpee	T. Burpee	Gibson, N. B.
New Canaan	Wm. St. John		New Canaan, Conn.
New Castle & Franklin	A. Vandivort		New Castle, Pa.
New Haven & Derby	E. S. Quintard		New Haven, Conn.
New Haven & Northampton	C. N. Yeamans	C. N. Yeamans	New Haven, Conn.
New Jersey & New York	J. D. Hasbrouck		Jersey City, N. J.
New Jersey Southern	Rufus Blodgett		119 Lib. st., N. Y.
New Orleans & Selma	L. S. Scofield		Selma, Ala.
New York, Lake Erie & Western	*Robert Harris		New York, N. Y.
New York, Lake Erie & Western	E. S. Bowen	J. A. Hardenbergh	New York, N. Y.
New York, Lake Erie & Western	‡O. Chanute		New York, N. Y.
New York, Lake Erie & Western	**P. F. Wright		Jersey City, N. J.
Eastern Division	E. O. Hill		Port Jervis, N. Y.
Delaware Division	Benj. Thomas		Port Jervis, N. Y.
Susquehanna Division	R. B. Cable		Elmira, N. Y.
Buffalo & Rochester Div	R. G. Taylor		Buffalo, N. Y.
Western Division	J. S. Beggs		Dunkirk N. Y.
New York & Greenwood Lake	Wm. P. Harris		Jersey City, N. J.
New York, New Haven & Hartford	*E. M. Reed	R. N. Dowd	New Haven, Conn.
N. Y. & N. H. Division	John T. Moody		New York, N. Y.
Hartford Division	C. S. Davidson		Hartford, Conn.
Shore Line Division	W. H. Stevenson		New Haven, Conn.
New York Central & Hudson Riv			
Hudson River & Harlem Div	J. M. Toucey	R. C. Moore	New York, N. Y.
Eastern Division	Zenas C. Priest		Utica, N. Y.
Western Division	Geo. H. Burrows		Rochester, N. Y.
New York Central Division	Jas. Tillinghast		Albany, N. Y.
New York & Harlem	Chas. M. Bissell	R. C. Moore	New York, N. Y.
New York & New England	*Jas. H. Wilson	W. W. McKim	Boston, Mass.
Eastern Division	O. M. Shepard		Boston, Mass.
Norwich Division	P. St. M. Andrews		Norwich, Conn.
Western Division	J. T. McManus		Hartford, Conn.
Providence Division	L. W. Palmer		Providence, R. I.
New York, Ontario & Western	Jas. E. Childs		Middletown, N.Y
Middle Div	N. R. Hankin	Charles Clark	Middletown, N. Y.
Northern Division	C. W. Lanpher		Norwich, N. Y.
Southern Division	A. H. Danforth		Middletown, N. Y.
New York, Penn. & Ohio	P. D. Cooper	J. H. Holway	Cleveland, O.
First & Second Divisions	A. L. Dunbar		Meadville, Pa.
Third and Fourth Divisions	T. A. Phillips		Galion, O.
Mahoning Division	J. M. Ferris		Cleveland, O.
New York, Providence & Boston	J. B. Gardiner		Providence, R. I.
New York, Providence & Boston		Giles F. Ward	Stonington, Conn.
Northern Pacific	*H. E. Sargent	E. T. Williams	St. Paul, Minn.
Northern Pacific	H. A. Towne		Brainerd, Minn.
Pacific & P. Oreille Div	J. W. Sprague	J. W. Sprague	New Tacoma, W. T.
Missouri Division	D. R. Taylor		Mandon Dak.
Dakota Division	C. T. Hobart		Fargo, Dak.
Northern of Canada	*F. W. Cumberland		Toronto, Can.
North Carolina	See Piedmont Air-Line.		
Northern Central	*Frank Thomson		Philadelphia, Pa.
Northern Central		A. W. Sumner	Baltimore, Md.
Baltimore Division	G. C. Wilkins		Baltimore, Md.
Elmira & Canandaigua Div	R. Neilson		Elmira, N. Y.
Susquehanna Division	W. A. Baldwin		Williamsport, Pa.
Northern (New Hampshire)	George F. Todd		Concord., N. H.
Northeastern (Georgia)	Lyman Wells		Athens, Ga.
Northeastern (South Carolina)	J. F. Devine		Charleston, S. C.
North Pacific Coast	W. C. Fillmore	W. F. Russell	San Francisco, Cal.
Northwestern Ohio	J. S. Morris		Toledo, O.
Northern & Northwestern	Jas. Webster		Toronto, Can.
O			
Ogdensburg & Lake Champlain	*A. A. Gaddis		Malone, N. Y.
Ogdensburg & Lake Champlain	A. Kobs		Malone, N. Y.
Ohio Central	*G. G. Hadley	F. W. Stewart	Columbus, O.
Ohio Central	F. W. Stewart		Toledo, O.
Ohio & Mississippi	W. W. Peabody	G. E. Atwood	Cincinnati, O.
Eastern Division	C. B. Cole		Seymour, Ind.
Western Division	C. M. Stanton		St. Louis, Mo.
Louisville Division	C. Cole		Louisville, Ky.
Old Colony	J. R. Kendrick	R. W. Husted	Boston, Mass.
Northern Division	§S. A. Webber		Fitchburg, Mass.
Cape Cod Division	‡C. H. Nye		Hyannis Mass.
Main Line Division	§J. H. French		Boston, Mass.
Olean Bradford & Warren	J. W. Watson		Olean, N. Y.
Olean Bradford & Warren		J. H. Poole	Buffalo, N. Y.
Omaha & Republican Valley	P. J. Nichols		Omaha, Neb.
Omaha & Northern Nebraska	J. E. House		Omaha, Neb.
Oregon & California	J. Brandt, Jr.	J. Brandt, Jr.	Portland, Oregon.
Oregon Railway & Navigation Co.	G. J. Ainsworth		Portland, Oregon.
Owensboro & Nasaville	E. Culverhouse		Owensboro, Ky.
P			
Paducah & Elizabethtown	Robert Meek		Elizabethtown, Ky.
Painesville & Youngstown	**J. A. Newcome		Youngstown, O.

Railroad.	Superintendent.	Purchasing Agent.	Residence.
Parker & Karns City	W. C. Moberly		Parker City, Pa.
Peach Bottom	S. M. Manifold		York, Pa.
Paw Paw & Toledo & South Haven	John Ihing		Lawton, Mich.
Pennsylvania	*Frank Thomson	Enoch Lewis	Philadelphia, Pa.
Pennsylvania	Charles E. Pugh		Altoona, Pa.
Pennsylvania	**John Reilly		Altoona, Pa.
New York Division	James McCrea		Jersey City, N. J.
Amboy Division	I. S. Buckelew		Camden, N. J.
Belvidere Division	J. A. Anderson		Lambertville, N. J.
New Jersey Division	F. Wolcott Jackson		Jersey City, N. J.
Philadelphia Division	W. F. Lockard		Philadelphia, Pa.
Middle Division	S. M Prevost		Harrisburg, Pa
Pittsburg Division	Robert Pitcairn		Pittsburg, Pa.
Tyrone Division	S. S. Blair		Tyrone, Pa.
Bedford Division	Tho. A. Roberts		Harrisburg, Pa.
West Pennsylvania Division	E. B. Taylor		Allegheny City, Pa.
Lewistown Division	J. B. Hutchinson		Lewistown, Pa.
Pensacola & Selma	Geo. Nason		Pensacola, Fla.
Peoria, Decatur & Evansville	G. R. Cobleigh	G. R. Cobleigh	Peoria, Ill.
Peoria, Pekin & Jacksonville	*Robert Stewart		Peoria, Ill.
Peoria & Springfield	J. R. Hilliard	J. R. Hilliard	Peoria, Ill.
Petersburg	R. Sully	L. E. Clark	Petersburg, Va.
Philadelphia & Atlantic City	Ellis Clark	Ellis Clark	Philadelphia, Pa.
Philadelphia & Reading	*J. E. Wootten	W. S. Wilson	Philadelphia, Pa.
Catawissa & Williamsport Br.	D. C. Reinhart		Williamsport, Pa.
Reading & Columbia	Alex. M. Wilson		Columbia, Pa.
Lebanon & Tremont	H. W. Tracy		Pine Grove, Pa.
N. Penn. & B. Brook Divis'n.	E. A. Sweigard		Philadelphia, Pa.
Philadelphia & Baltimore Central	Henry Wood	Henry Wood	Philadelphia, Pa.
Philadelphia & Erie	Wm. A. Baldwin		Williamsport, Pa.
Philadelphia & Erie		Enoch Lewis	Philadelphia, Pa.
Western Division	J. W. Reynolds		Erie, Pa.
Middle Division	E. B. Westfall		Renovo, Pa.
Eastern Division	Thomas Gucker		Williamsport, Pa.
Danv., Haz. & W. Barre Div.	Joseph Crawford		Sunbury, Pa.
Philadelphia, Wilmington & Balt.	H. F Kenney		Philadelphia, Pa.
Philadelphia, Newt'n & New York	L. L. Bush		Philadelphia, Pa.
Piedmont Air-Line	T. M. R. Talcott	R. H. Duesberry	Richmond, Va.
Richmond & Danville Div.	W. A. Green		Richmond, Va.
North Carolina Division	A. B. Andrews		Raleigh, N. C.
Pine River Valley & Stevens Pt	N. L. James		Richl'nd Cent., Wis.
Pittsburg & Castle Shannon	A. C. Hays		Pittsburg, Pa.
Pittsburg & Lake Erie	R. W. Jones		Pittsburg, Pa.
Pittsburg, Cincinnati & St. Louis	S. M. Felton, Jr.	William Mullins	Pittsburg, Pa.
Pittsburg, Cincinnati & St. Louis	*D. W. Caldwell		Columbus, O.
Pitts., Cin. & St. Louis Div.	J. H. Barrett		Pittsburg, Pa.
Col., Cin. & Ind., Cent. Div.	D. T. Bacon		Logansport, Ind.
Col., Chi. & Ind., Cent. Div.	J. F. Miller		Richmond, Ind.
Indianap. & Vincennes Div.	E. W. McKenna		Indianapolis, Ind.
Cincin. & Musk. Valley Div.	Wm. F. Black		Zanesville, O.
Little Miami Div.	C. C. Waite		Cincinnati, O.
Pittsburg, Ft. Wayne & Chicago	*J. D. Layng	William Mullins	Pittsburg, Pa.
Pittsburg, Ft. Wayne & Chicago	‡C. E. Gorham		Chicago, Ill.
Eastern Division	George S. Griscom		Pittsburg, Pa.
Western Division	C. D. Gorham		Fort Wayne, Ind.
Pittsburg & Western	J. R. Bonner		Allegheny, Pa.
Pittsburg, Titusville & Buffalo	Tho. H. Wilson		Oil City, Pa.
Pittsburg, Titusville & Buffalo		John L. Awl	Pittsburg, Pa.
Pittsburg, Virginia & Charleston	J. M. Byers		Pittsburg, Pa.
Port Dover & Lake Huron	A. B. Atwater		Woodstock, Ont.
Port Royal & Augusta	R. G. Fleming		Augusta, Ga.
Portland & Ogdensburg	Jonas Hamilton	Jonas Hamilton	Portland, Me.
Portland & Rochester	G. P. Wescott, *Rec*		Portland, Me.
Potomac, Fredericksb'h & Pied't	Charles Kennedy		Fredericksb'h, Va.
Poughkeepsie, Hartford & Boston	J. A. Perkins	A. W. Cable	Poughkeepsie, N. Y
Prince Edward Island	L. B Archibald	L. B. Archibald	Charlottet'n, P. E. I
Prospect Park & Coney Island	R. Schermerhorn		Coney Island, N. Y
Providence & Springfield	William Tinkham	William Tinkham	Providence, R. I.
Providence & Worcester	W. E. Chamberlain		Providence, R. I.
Providence, Warren & Bristol	Waterman Stone		Providence, R. I.

Q

Railroad.	Superintendent.	Purchasing Agent.	Residence.
Quebec, Mont., Ott'a & Occidental	L. A. Senecal	W. E. Blumhart	Montreal, Can.
Quebec Central	§A. Steele		Sherbrooke, Can.
Queen Anne & Kent County	P. H. Irwin		Centreville, Md.
Quincy, Missouri & Pacific	F. D. Schermerhorn		Quincy, Ill.

R

Railroad.	Superintendent.	Purchasing Agent.	Residence.
Raleigh & Augusta Air-Line	J. C. Winder		Raleigh, N. C.
Raleigh & Gaston	J. C. Winder		Raleigh, N. C.
Rhinebeck & Connecticut	J. H. Jones		Rondout, N. Y.
Richmond, York Riv. & Chesap'ke	H. T. Douglas	B. S. Crouch	Richmond, Va.
Richmond & Allegheny	*Decatur Axtell		Richmond, Va.
Richmond & Danville	(See Piedmont Air-Line).		
Richmond, Frederick'h & Potomac	E. T. D. Myers	T. L. Courtney	Richmond, Va.
Richmond & Petersburg	Theo. D. Kline		Richmond, Va.
Rio Grande	*M. J. Gomila		Brownsville, Tex.
Rochester & Pittsburg	Geo. E. Merchant		Rochester, N. Y.
Rockwood & Tennessee River	H. Clay Evans		Rockwood, Tenn.
Rock Island & Mercer County	*R. R. Cable		Rock Island, Ill.
Rock Island & Peoria	H. B. Ludlow		Rock Island, Ill.
Rome	Eben Hillyer		Rome, Ga.
Rome, Watertown & Ogdensburg	E. A. Van Horne		Watertown, N. Y.
Rome, Watertown & Ogdensburg		G. W. B. Cushing	New York City.
Rumford & Buckfield	O. Hayford		Canton, Me.

S

Railroad.	Superintendent.	Purchasing Agent.	Residence.
Scioto Valley	Joseph Robinson		Columbus, O.
Sciota Valley		C. H. Cory	Portsmouth, O.
St. Croix & Penobscot	Wallace Haycock		Milltown, Me.
St. Lawrence & Ottawa	†Tho. Reynolds	Tho. Reynolds	Ottawa, Can.
St. Johns	R. McLaughlin		Jacksonville, Fla.
St. Johns & Indian River	W. H. Churchill		Titusville, Fla.
St. John & Maine	H. D. McLeod		St. John, N. B.
St. Johnsbury & Lake Champlain	A. B. Jewett		St. Johnsbury, Vt
St. Joseph & Des Moines	J. F. Barnard		St. Joseph, Mo.
St. Joseph & Western	L. D. Tuthill		St. Joseph, Mo.
St. Joseph & Western		A. D. Clarke	Omaha, Neb.
St. Louis, Alton & Terre Haute	Beriah Warren	Beriah Warren	St. Louis, Mo.
St. Louis, Hannibal & Keokuk	W. W. Walker		Hannibal, Mo.
St. Louis, Iron Mountain & South	Arthur W. Soper	W. S. Cuddy	St. Louis, Mo.
Texas Division			Texarkana, Ark.
Missouri Division	Wm. Kerrigan		St. Louis, Mo.
St. Louis & San Francisco	*C. W. Rogers	A. G. Thompson	St. Louis, Mo.
St. Louis & San Francisco	‡D. H. Nichols		Springfield, Mo.
Kansas Division	W. A. Thoms		Neodesha, Kan.
St. Louis, Keokuk & Northwest'n	A. L. Griffin	John A. Blood	Keokuk, Ia.
St. Louis, Salem & Little Rock	E. B. Sankey		Salem, Mo.
St. Louis, Salem & Little Rock		H. A. Crawford	St. Louis, Mo.
St. Louis Bridge Co. & Tunnel R. R.	J. B. Van Dyne	J. E. Williams, Jr.	St. Louis, Mo.
St. Paul & Duluth	Geo. H. Smith		St. Paul, Minn.
St. Paul, Minneapolis & Manitoba	*Jas. J. Hill	J. C. Morrison	St. Paul, Minn.
St. Paul, Minneapolis & Manitoba	E. B. Wakeman		St. Paul, Minn.
St. Paul & Sioux City	E. W. Winter		St. Paul, Minn.
Sacramento & Placerville	Josiah Johnson		Sacramento, Cal.
Saginaw Valley & St. Louis	N. W. Merrill	N. W. Merrill	Saginaw, Mich.
San Francisco & North Pacific	H. C. Whiting	P. E. Dougherty	San Francisco, Cal.
San Rafael & San Quentin	David Nye		San Rafael, Cal.
Savannah, Florida & Western	*H. S. Haines	W. B. McKee	Savannah, Ga.
Savannah, Florida & Western	§F. S. Pendergast		Savannah, Ga.
Savannah & Memphis	*G. J. Foreacre		Atlanta, Ga.
Seaboard & Roanoke	J. M. Robinson	J. A. Walton	Baltimore, Md.
Sedalia, Warsaw & Southern	G. H. Huntington		Sedalia, Mo.
Selma & Greensboro	A. M. Fowlkes		Selma, Ala.
Selma, Rome & Dalton	J. F. O'Brien		Selma, Ala.
Sheboygan & Fond du Lac	E. J. Cuyler		Fond du Lac, Wis.
Shenango & Allegheny	J. T. Blair		Greenville, Pa.
Shepaug	Edwin McNeill		Litchfield, Conn.
Sioux City & Pacific	J. S. Wattles		Missouri Valley, Ia.
Sioux City & Pacific	*P. E. Hall	P. E. Hall	Cedar Rapids, Ia.
Skaneateles	J. McNamara		Skaneateles, N. Y.
South Carolina	John B. Peck	S. B. Pickens	Charleston, S. C.
Southeastern of Canada	H. A. Alden		Newport, Vt.
Southern Central	Jas. G. Knapp		Auburn, N. Y.
South Mountain	W. H. Woodward		Pine Grove Furnace, Pa.
Southern Pacific	A. C. Bassett	John R. Watson	San Francisco, Cal.
Los Angeles & Yuma Div.	§E. E. Hewitt		Los Angeles, Cal.
Tulare Division	A. D. Wilder		Oakland, Cal.
South Pacific Coast	F. W. Bowen		San Francisco, Cal.
Southwestern of Georgia	W. G. Raoul		Macon, Ga.
Southwestern of Kentucky	M. Tabler		Harrodsburg, Ky.
Spartanburg, Union & Columbia	Jas. Anderson	Jas. Anderson	Spartanburg, S. C.
Spartanburg & Asheville	Jas. Anderson	Jas. Anderson	Spartanburg, S. C.
Springfield, Athol & Northeastern	John W. Phelps		Springfield, Mass.
Springfield & Northwestern	E. B. Hyde	E. B. Hyde	Springfield, Ill.
Springfield Southern	Wm. Thornburg	G. A. Barnes	Springfield, O.
Springhill & Parsboro	J. A. Killam		Parsboro, N. S.
State Line & Sullivan	J. O. Blight		Towanda, Pa.
Staten Island	John W. Wilber		Tottenville, N. Y.
Sterling Mountain	J. C. Missimer		Sloatsburg, N. Y.
Summit Branch	R. C. Peebles		Lykens, Pa.
Summit County	W. M. Riter		Coalville, Utah.
Sussex	E. C. Case	E. C. Case	Newtown, N. J.
Syracuse, Binghamton & N. Y.	W. K. Niver		Syracuse, N. Y.
Syracuse, Binghamton & N. Y.		G. W. B. Cushing	New York, N. Y.
Syracuse, Chenango & New York	Albert Allen		Syracuse, N. Y.
Syracuse, Geneva & Corning	A. H. Gorton	Andrew Beers	Corning, N. Y.

T

Railroad.	Superintendent.	Purchasing Agent.	Residence.
Tennessee & Pacific	J. W. Thomas		Nashville, Tenn.
Terre Haute & Ind'apolis (Vandalia Line.)	Col. Josh A. Hil		St. Louis, Mo.
Terre Haute & Ind'apolis (Vandalia Line.)	Joshua Staples		Indianapolis, Ind.
Terre Haute & Ind'apolis (Vandalia Line.)		C. R. Peddle	Terre Haute, Ind.
Logansport Division			Logansport, Ind.
Terre Haute & Southeastern	George Atherton		Terre Haute, Ind.
Texas & New Orleans	C. A. Burton	P. B. Watson	Houston, Tex.
Texas & Pacific	Geo Noble	C. C. Commisky	Marshall, Tex.
Jefferson Division	J. S. Noble		Texarkana, Ark.
Southern Division	C. Harris		Marshall, Tex.
Texas Western	J. W. Goodwin		Houston, Tex.
Texas & St. Louis	J. W. Brown		Tyler, Tex.
Tioga	L. H. Shattuck		Blossburg, Pa.
Tioga		Jas. A. Drake	Elmira, N. Y.
Toledo, Delphos & Burlington	W. J. Brownson	H. A. Eaton	Delphos, O.
Dayton Division	J. O. Arnold		Dayton, Ohio
Toledo & Ann Arbor	H. W. Ashley		Ann Arbor, Mich.
Troy & Boston	E. E. Aldrich	D. Robinson	Troy, N. Y
Toronto, Grey & Bruce	*Edmund Wragge	W. Watson	Toronto, Can.
Toronto & Nipissing	John Duncan	John Symons	Toronto, Can.
Tuckerton	J. J. Pharo		Tuckerton, N. J.

U

Railroad.	Superintendent.	Purchasing Agent.	Residence.
Ulster & Delaware	Geo. Coykendall		Rondout, N. Y.
Union Pacific	*S. H. H. Clarke	A. D. Clark	Omaha, Neb.
Union Pacific	§Jas. T. Clarke		Omaha, Neb.
Eastern Division	P. J. Nichols		Omaha, Neb.
Western Division	W. B. Doddridge		Evanston, Wy. T.
Mountain Division	Robert Law		Cheyenne, Wy. T.
Laramie Division	Edw. Dickinson		Laramie, Wy. T.
Colorado Division	A. A. Egbert		Denver, Col.
Kansas Division	S. T. Smith		Kansas City, Mo.
Denver & S. Park Division	C. W. Fisher		Denver, Col.
Union R. R. Trans. & S. Yard Co.	*M. A. Downing	**Albert Scott	Indianapolis, Ind.
Utah Central	John Sharp	S. H. Hill	Salt Lake City.
Utah Northern	Geo. W. Thatcher		Logan, Utah.
Utah Western	*W. W. Riter	W. W. Riter	Salt Lake City.
Utica & Black River	J. F. Maynard		Utica, N. Y.
Utica, Ithaca & Elmira	Geo. J. Rice	J. L. Greatsinger	Horse Heads, N. Y

V

Railroad.	Superintendent.	Purchasing Agent.	Residence.
Valley	Samuel Briggs	Samuel Briggs	Cleveland, O.
Vicksburg & Brunswick	W. G. Raoul		Macon, Ga.
Vermont Valley	John Mulligan		Springfield, Mass.
Vicksburg & Meridian	E. F. Raworth	E. F. Raworth	Vicksburg, Miss.
Vicksburg, Shreveport & Pacific	*J. W. Green	J. W. Green	Monroe, La.
Virginia & Truckee	H. M. Yerington	C. P. Mason	Carson, Nev.
Virginia Midland	*Peyton Randolph		Alexandria, Va.

W

Railroad.	Superintendent.	Purchasing Agent.	Residence.
Wabash, St. Louis & Pacific	*John C. Gault	R. W. Green	St. Louis, Mo.
Eastern Division	R. Andrews		Toledo, O.
Western Division	Thos. McKissock		St. Louis, Mo.
Illinois Division	H. F. Clark		Springfield, Ill.
Ohio & Indiana Division	K. H. Wade		Fort Wayne, Ind.
St. L., K. C. & N	G. B. Parsill		Moberly, Mo.
Council Bluffs & Omaha Div.	J. W. Blanchard		Stanberry, Mo.
Peoria & Iowa Division	W. F. Merrill		Peoria, Ill.
Kansas City Division	M. G. Cary		Kansas City, Mo.
Quincy, Mo. & Pacific Div.	F. D. Schermerhorn		Quincy, Ill.
Chicago Division	A. H. Wood		Bement, Ill.
Iowa Division	E. N. Armstrong		Keokuk, Ia.
Wabash, Chester & Western	J. L. Hinkley		Chester, Ill.
Wallkill Valley	J. H. Jones		Rondout, N. Y.
Washington & Ohio	R. H. Havener	R. H. Havener	Alexandria, Va.
Waukon & Mississippi	F. O. Wyatt		Dubuque, Ia.
Waynesburg & Washington	Jacob Swart		Waynesburg, Pa.
Welland	William Pay		St. Catherine, Ont
Westchester & Philadelphia	Henry Wood	Henry Wood	Philadelphia, Pa.
West Feliciana	J. B. McGehee		Laurel Hill, La.
West Jersey	Jos. Crawford		Camden, N. J.
Western of Alabama	*Cecil Gabbett	Cecil Gabbett	Montgomery, Ala.
Western of North Carolina	L. C. Jones		Fayetteville, N. C.
Western & Atlantic	Wm. McRae	W. R. Webster	Atlanta, Ga.
Western Maryland	*J. M. Hood	J. M. Hood	Baltimore, Md.
Western North Carolina	A. B. Andrews	Geo. P. Erwin	Asheville, N. C.
Whitewater	W. W. Worthington		Ft. Wayne, Ind.
Whitby, Port Perry & Lindsay	†Jas. Holden		Whitby, Ont.
Wicomoco & Pocomoke	H. R. Pitts		Berlin, Md.
Williamstown	J. F. Bodine		Williamstown, N. J.
Wilmington, Columbia & Augusta	J. F. Divine	J. F. Divine	Wilmington, N. C.
Wilmington & Northern	J. H. Thompson		Coatesville, Pa.
Wilmington & Weldon	J. F. Divine	J. F. Divine	Wilmington, N. C.
Windsor & Annapolis	*P. Innes		Kentville, N. S.
Wisconsin Central	*F. N. Finney	J. W. Curtiss	Milwaukee, Wis.
Mil. & Eastern Div.	C. F. Dutton		Milwaukee, Wis.
So. Mid. & Northern	G. Campbell		Steven's Point, Wis.
Wisconsin Valley	F. O. Wyatt		Tomah, Wis.
Woodstock	J. G. Porter		Woodstock, Vt.
Worcester & Nashua	G. W. Hurlburt	C. S. Turner	Worcester, Mass.
Worcester & Shrewsbury	J. F. Bigelow		Worcester, Mass.
Worcester & Somerset	F. J. Painter		Philadelphia, Pa.

Y

Railroad.	Superintendent.	Purchasing Agent.	Residence.
Youghiogheny	Wm. Wilson		Irwin's, Pa

Also Broad Hatchets, Axes and

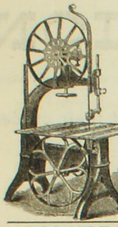
EAMES VACUUM BRAKE CO.,

RAILWAY TRAIN BRAKES,

P. O. Box 2878. SALES OFFICE, 15 GOLD ST., NEW YORK. Represented by THOMAS PROSSER & SON.

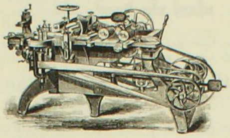
THE EAMES VACUUM BRAKE is confidently offered as the most efficient, simple, durable, and cheapest power Brake in the market. CAN BE SEEN IN OPERATION UPON OVER FIFTY ROADS.

BAND SAW.



MANUFACTURERS OF WOOD-WORKING MACHINERY.

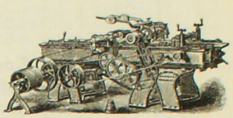
OUTSIDE MOLDER.



The Latest Improved **MACHINERY** for Railroad Car Shops.

Planers, Vertical Car Tenoners, Gaining, Tenoning, Rotary Mortising Machines.

INSIDE MOLDER.



C. B. ROGERS & Co.,

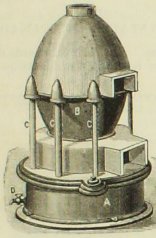
MANUFACTORY, NORWICH, CONN.
WAREROOMS, 109 Liberty St., New York.

WINSLOW'S SAFETY CAR STOVE,

MANUFACTURED BY

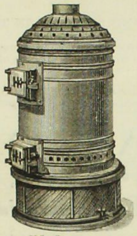
A. P. WINSLOW & CO., 89 SENECA ST., CLEVELAND, OHIO.

No. 1.—Stove without Jacket. Letter A, Cast-iron Tank, containing 16 gallons of water, and will immediately extinguish the fire when the car is overturned; letter B, Fire Pot; letter CC, Pipes leading from Tank into Fire Pot; letter D, *Discharge Cock*; letter E, *Filler*.



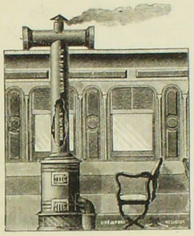
NO. 1.

No. 2.—Stove as set up in car, and will burn either hard or soft coal or coke. PRICE of Nos. 2 and 3, **$40.00**, ON CARS HERE. This does not include Smoke or Air Pipes.



NO. 2.

No. 3.—Designed for conducting hot air along the sides of the car, distributing same by means of the registers equally throughout the entire car, changing the air every three to five minutes, forcing the impure air out at the top of car—thus *heating* and *ventilating* the car perfectly.

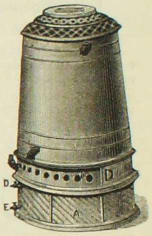


NO. 3.

BAKER HEATER,

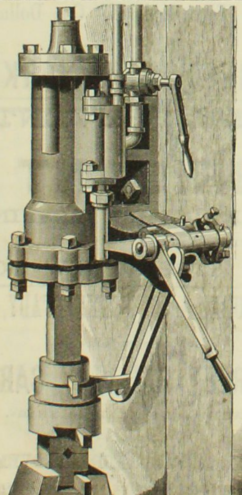
WITH WINSLOW'S SAFETY TANK, as applied to Heaters on L. S. & M. S. R'y and Wagner Sleeping Car Co.

Mail or Palace Cars that have Baker Heaters can be supplied with our Safety Tank at trifling expense, as above cut.



It has proved a great success as a heater, on account of the very large volume of air heated.
It also fills the great desideratum so long sought for, *perfect ventilation* during the summer by discharging a constant stream of cold air through the registers, keeping car free from dust and cinders

---



Send for Circular and Price List.

EUREKA SELF-ACTING STEAM HAMMER.

TESTIMONIALS.

The following communications are respectfully submitted, a perusal of which will convince any one who has work that a EUREKA STEAM HAMMER will do, that they cannot afford to be without one or more; they will soon pay for themselves by saving on pay-roll.

Jackson & Woodin M'f'g Co., Car Builders,
A. H. KING, Esq. Berwick, Pa., Jan. 12, 1881.
Dear Sir: We have had one of the Eureka Steam Hammers bought of you, in constant use during the past year, and are now placing the second one in position. The Eureka does the work in a manner highly satisfactory, greatly increasing the capacity of our smith shop, and making such a saving of time and labor, that we consider it one of the most economical machines in our works. Our experience with the Eureka Hammer justifies us in giving it our highest recommendation.
Yours truly, C. R. WOODIN, Pres.
The Jackson & Woodin M'f'g Co.

Harrisburg Car M'f'g Co., Harrisburg, Pa., Nov. 11, 1880.
A. H. KING, Esq., 46 Cortlandt st., N. Y.
Dear Sir: Please ship us one Eureka Steam Hammer, 5 × 10 inches; make the delivery as early as possible.
Respectfully yours, W. T. HILDRUP, Supt.

A. H. KING, Esq. Harrisburg, Pa., Dec. 2, 1880.
Dear Sir: Please send us as soon as you can one Eureka Steam Hammer, 6¾ × 24 inches; send as early as possible. Will probably want another, 5 × 10 inches. Hope you have the above so that you can send it at once.
Respectfully yours, W. T. HILDRUP, Supt.

A. H. KING, Esq. Harrisburg, Pa., Jan. 6, 1881.
Dear Sir: You will please send to our Foundry and Machine Works, Harrisburg, Pa., one of your Eureka Steam Hammers, 5½ × 16 inches. Please send it as early as possible.
Respectfully yours, W. T. HILDRUP, Supt.

National Car Spring Co.,
A. H. KING, Esq. Newark, N. J., Jan. 15, 1881.
Dear Sir: You ask my opinion of the Eureka Steam Hammer. Well, sir, we have one in use at the present, and, all I can say, I would hardly know what to do without it. It does our work nicely. We hammer Iron 4 inches wide, 1 inch thick, down to ½ inch, with one heat, and it does it nicely. We have had this Hammer about two years, and have had it running most every day; for my part, I think it is a first-class Hammer. Hoping this is satisfactory, I remain,
Yours truly, D. P. CLARK, Supt.

A. H. KING, Esq. Greenpoint, Brooklyn, N. Y., Jan., 1881.
Dear Sir: We have used three Eureka Steam Hammers for some time, and they work first rate. We sold one, as we thought it too small for our use; afterward we attempted to purchase it back from the party we sold it to, but they would not part with it; we therefore bought another new one.
Yours truly, T. F. ROWLAND,
Proprietor, Continental Iron Works.

North River Iron Works, 266 and 267 West st.,
A. H. KING, Esq. New York, January, 1881.
Dear Sir: We have two Eureka Steam Hammers at work in our shops; we are entirely satisfied with them, and would not be without them for a good deal. We recommend them to any one who does forging.
Yours respectfully, W. & A. FLETCHER.

Office of the American Tube Works, Boston, Mass., Jan., 1881
A. H. KING, Esq., 46 Cortlandt st., N. Y.
Dear Sir: We have used the Eureka Steam Hammer a long time, and would not be without it. It is easily worked by ordinary smith's helper.
Yours respectfully, E. B. BUCKINGHAM, Pres.

H. C. Sergeant, Pres. Sergeant & Cullingworth Co.,
G. R. Cullingworth, Sec. Machine Manufacturers,
382 Second ave., cor 22d st.,
A. H. KING, Esq. New York, January, 1881.
Dear Sir: We have had a Eureka Steam Hammer in use about nine months, and find it very useful for our work. We think there is no better. Yours respectfully,
SERGEANT & CULLINGWORTH CO.

Sam'l Hall's Son, Manufacturer of Screw Bolts, Nuts and Washers, 229 West Tenth st., New York, Jan. 15, 1881.
A. H. KING, Esq., 46 Cortlandt st., N. Y.
Dear Sir: In reply to yours I would say we have used one of the Eureka Steam Hammers a long time, forging heads on large bolts and other general work, which it does exceedingly well. Am much pleased with it.
Yours truly, SAM'L HALL'S SON.

Tubal Cain Iron Works, 127 Water st.,
A. H. KING, Esq. Brooklyn, January, 1881.
Dear Sir: We find the Eureka Steam Hammer does our work very well. The Square Piston Rod is a most excellent feature, as it is easily packed and prevents the Hammer from twisting. We would recommend it in the highest terms to those requiring a Steam Hammer.
Yours very respectfully, JOHN ROBERTSON & CO.,
Proprietors, Tubal Cain Iron Works

ALBERT H. KING, 46 Cortlandt St., New York, U. S. A.